Climate change, environment and development

Chapter 17

Climate Change, Environment and Development

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<A>Learning Objectives

- To understand the intricate and complex relationship between climate change, environment and development;
- To learn the key historical and more recent developments in the environment, climate change and development nexus;
- To engage with the key debates, concepts, actors and institutions in the global governance of environment and sustainable development.

<A>Introduction

From its original position as a subject of peripheral concern, the environment has become one of the central topics in international development discourse. Today, climate change, a quintessential environmental problem, is generally recognised as the most important development challenge in the 21st century (IPCC, 2014). In addition to acknowledging its many significant direct consequences, climate change is increasingly used to frame discussions on other important global challenges, such as health, energy and food security.

For a long period in international development history, the focus of debates and policies was essentially about how to stimulate economic growth mostly by increasing industrialization and mass consumption in developing countries. A popular philosophy that underpinned the emphasis on economic growth was the notion that environmental protection was the preserve of the rich – something that is necessary only after a certain level of economic growth had been attained. This philosophy, which continues to exert powerful influence today, is not without

some intuitive appeal. For example, alleviating poverty would seem a natural priority when compared to measuring the size of, or closing a hole in the ozone layer. While the former would immediately strike many as a matter of urgent need, the latter, in contrast, might seem as an exotic and abstract scientific preoccupation. Moreover, common observation shows that developed countries generally tend to have cleaner environments (air, water, etc.) in addition to higher quality of lives. It is difficult to question the many benefits that economic development has brought to poorer countries, for example, improved mortality rate, better education, improved wellbeing, enhanced sanitation etc.

In recent years however, the place of the environment in economic development has become a matter of intense academic and public policy debate. The rise of environment as a key issue in international development is rooted in three facts. First is the extensive and increasing impact of humans on all aspects of the environment (IPCC, 2014; Millennium Ecosystem Assessment, 2005). Secondly, advances in science and technology have afforded not only better understanding of the extent of the environmental damage being caused by humans, but also the tools to more widely communicate and disseminate this information. Consider for example the impact of iconic images of environmental degradation in the Nigerian Niger Delta, an entire village in Bangladesh being displaced by climate change induced flood, or more recently live TV pictures of the BP oil spill in the Gulf of Mexico in 2010. Thirdly, there has been a greater realization of the propensity of environmental degradation to undermine the very basis of economic development and human well-being, for example air pollution in rapidly developing China.

Since the late 1960s, environmental issues and their links with development have been a subject of increasing international cooperation, with the creation of institutions and multilateral environmental agreements. Currently, the global community has decided to adopt Sustainable Development Goals (SDG) as the overarching framework for a post-2015 development agenda,

in a move that perhaps marks the clearest acknowledgement of the environment and development connection. The SDGs build on the eight Millennium Development Goals (MDGs) that were established through a summit of the UN in 2000. To date, the SDG process has engaged governments, international organisations and the wider civil society, with the hope that by September 2015, a universal sustainable development agenda, likely to extend until 2030, will be launched.

Overall, despite the rise of environment in international development and the elaboration of institutions and governance processes at national and global levels, there remains a widespread sense that international development efforts are yet to truly incorporate or internalize environmental considerations (Epstein and Buhovac, 2014; Reid, 2013) . Over 20 years since the concept of global sustainable development was adopted as the guiding principle of economic and international development, there are still no easy answers to the question of how best to effectively combine the goals of environmental protection and economic development at national and global levels (Ehresman and Okereke, 2015).

<A>THE CENTRAL PARADOX AND CONTENDING APPROACHES

The central paradox of the environment-development relationship is that whereas economic development is needed to achieve well-being, the process of economic growth often leads to environmental degradation, which in turn reduces well-being. Differences in understanding the exact nature of this relationship and how to resolve the complex interactions constitute the central challenge of environment-development politics across different scales of governance, from local through national to international levels. In addition, or rather in close relation to the paradox described above, environmental problems also exhibit two other defining characteristics – the one is the tragedy of commons and the other is the collective action problem.

<CATCH: Key Issues Box 17.1>

<A> Key Issues Box 17.1 Defining collective action problem and tragedy of commons

Collective action problem is a term that describes the situation in which multiple individuals (also communities or countries) would all benefit from a certain action, for example reducing greenhouse gas emissions that cause climate change, but, the associated cost of taking action makes it highly unlikely that any individual can or will undertake and solve the problem alone.

Famously linked to American ecologist Garth Hardin (1968) **the term, Tragedy Of The Commons** is linked describes an economic problem in which individual users of given commonly owned resource (say graze land or atmosphere) each continues to try to reap the greatest benefit from exploiting such a given resource even when it is apparent that the demand for the resource has overwhelmed the supply. The tragedy is that every individual who consumes an additional unit directly harms others who can no longer enjoy the benefits. Furthermore, the over exploitation, driven by individual gain, Hardin argues will ultimately result in the degradation of the common resource. (For an interesting critique of Hardin's thesis, see Ostom, 1990; Stonich et al., 2002).

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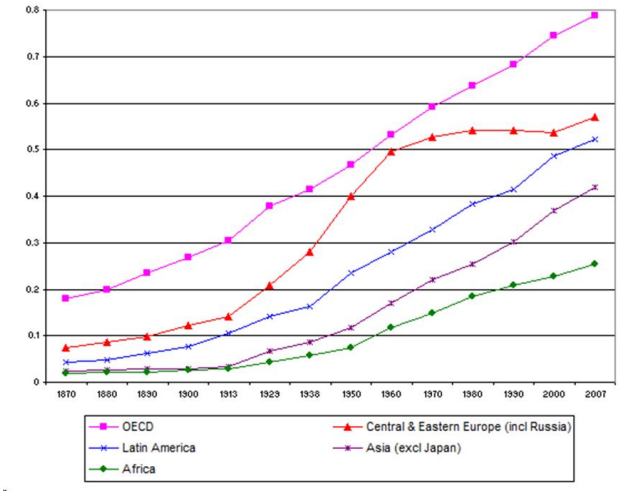
The figure below (Figure 17.1) shows the steady and dramatic increase in the quality of human lives from 1870 to 2007 based on life expectancy at birth, mean years of schooling, expected years of schooling and gross national income per capita (Escosura, 2013). Measurements based on other development indicators such as infant mortality, the number of people with access to safe drinking water and number of undernourished children also show that quality of living has been increasing across all regions of the world (Escosura, 2013).

<CATCH: Figure 17.1>

<A>Figure 17.1: World Human Development: 1870-2007



(Source: Escosura, 2013)

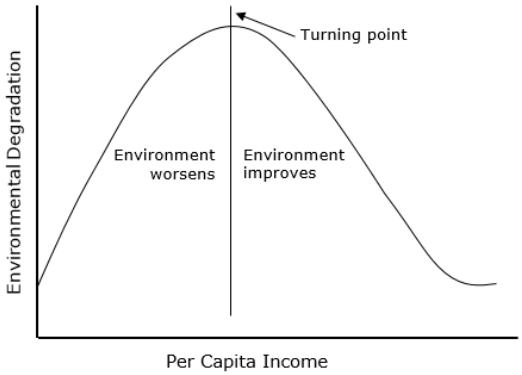
Advocates of modernization theory (see Chapter 3) to international development growth are quick to link these improvements to industrialization, urbanization, advances in technology, and increase in global trade. Accordingly, they suggest that economic growth is undeniably a good thing to which all countries should aspire. Moreover, they argue that the best help rich countries can offer poor countries is to export the same development models of state intervention used by the West and to help fast-track poor countries through the various stages of growth (Chambers 2014).

In addition, some economists have hypothesized that the relationship between economic development and environmental quality takes the form of an inverted U-shape, which is called the Environmental Kuznets Curve (EKC) (Figure 17.2) (Dietz et al., 2012). The EKC theory suggests that although environmental degradation generally increases as modern economic growth occurs, this increase comes to a halt and then starts to reverse after average income reaches a certain level in the course of development. The modernization theory and the EKC

remain highly influential in shaping international environmental and development polices to date. These approaches suggest that the solution to pollution and environmental degradation resulting from economic growth is in fact the pursuit of even more economic development.

<CATCH: Figure 17.2>

<A>Figure 17.1: Environmental Kuznets Curve



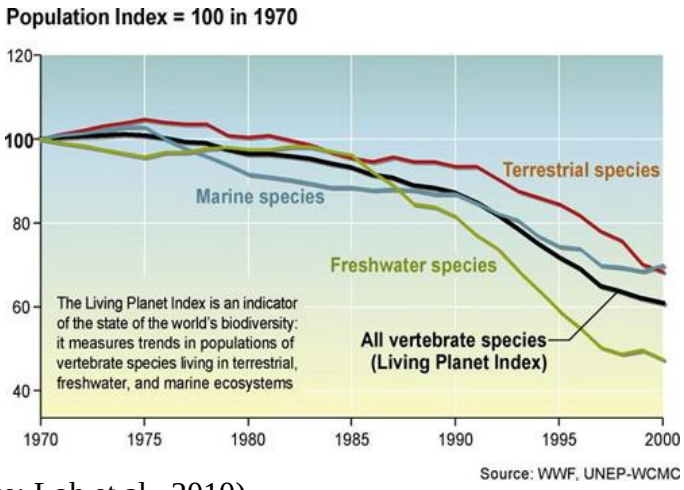
However, it has been noted that the scale of environmental destruction associated with economic development over the decades has become increasingly large. Figure 17.3 below is a graph of the global Living Planet Index (LPI), which shows the rapid decline in the number and diversity of vertebrate species living in terrestrial, marine, and freshwater ecosystems. Recent Global Ecosystem Assessment projects have shown that over the past 50 years humans have altered and negatively impacted on the natural environment in far more dramatic fashion compared to any other time in human history (Seppelt et al., 2011). Other global assessments also reveal drastic decrease in world biodiversity, extinction of many species, pollution of various types of ecosystems, and even decrease in levels of happiness (DeFries et al., 2012).

Critics have observed that in addition to elevating western values over indigenous cultures, modernization theory promotes a scale of environmental resource exploitation and consumerism, which is ultimately unsustainable (Hannigan, 2014). In addition, the validity of

EKC has been challenged. It has been pointed out that the relationship may not hold true for many pollutants, for natural resource use and for biodiversity conservation, especially when a global perspective is taken. For example, energy and land resource use do not fall as income rises (Dietz et al., 2012). Moreover, it has been argued that many developed countries attained and were able to maintain a certain level of environmental quality only because they were able to get most of their resources from, and shifted a high proportion of their pollution to the poor developing countries (Ewing and Rizk, 2008; Wackernagel et al., 1999).

<CATCH: Figure 17.3>

<A>Figure 17.1: Living Planet Index



(Source: Loh et al., 2010)

Furthermore, pointing to the degradation of global **common pool resources** such as the ocean, the atmosphere, and especially the role of Western industrialization in this process, many argue that more modernization can only portend danger for humanity as a whole (Gills, 2015; Takahashi, 2010). That said, many states and citizens in developing countries have not concealed their desire to attain the level of development comparable to the West and a willingness to achieve this goal irrespective of the immediate costs to the environment. The World Bank (2010:44) sums up the sentiment behind this view rather well when they declare that 'it is ethically and politically unacceptable to deny the world's poor the opportunity to ascend the

income ladder simply because the rich reached the top first' (World Bank, 2010). These observations form the foundation of the argument that only a global approach is sufficient to tackle the problem of environmental degradation and international development (Okereke, 2008). At the same time, it has also been reported that the question of how to achieve or maintain economic growth that supports a good quality of living without undermining the very natural support base upon which both growth and lives depend, cannot be met with a simple answer of – just more growth.

<CATCH: Key Issues Box 17.2>

<A> Key Issues Box 17.2: Environment-Development Paradox: The Case Of China

China has experienced rapid economic growth in the past 30 years, which has resulted in dramatic increases in certain aspects of wellbeing and a rise of significant environmental challenges. China's secondary industry currently produces the highest volume of industrial products in the world, including steel, cement, fertilizer and coal (Zhang, Abbas, and Shishkin, 2012), and was recently ranked fourth for crude oil production globally (National Bureau of Statistics of China, 2012 cited in Zhang et al., 2012). However, this rapid growth fuelled by energy from burning coal, natural resources and environmental services has caused severe environmental problems especially water and air pollution. China is home to some of the world cities with the worst air pollution record (Liu and Diamond 2005). Respiratory and heart diseases related to air pollution are the leading causes of death in China (Xu et al., 2014) with some studies suggesting that the problem of air pollution costs China up to 10% of GDP every year. China fares equally badly in many other environmental issues. Five of China's cities are in the top 25 of the most vulnerable cities to climate change in the world (Maplecroft, 2013). Additionally, about 40% of the water in the country's river systems is unfit for human consumption, and the combination of desertification and erosion have swept over almost 30% of China's land over the last two decades (Liu, 2013).

However, a comprehensive understanding of the environmental situation in China requires an acknowledgment of the impact of wider global economic forces and structures (Yang et al., 2013). China may have taken a high polluting route to development at least in part because of politics, national economic interests and ideological conflicts, which made it difficult for the country to access cleaner technologies from the West. Furthermore, many of the businesses that powered industrial development in China are Western companies that are interested in maximizing profit and value for their Western shareholder. Today, a vast proportion of the products being made in China are designed for consumption by western citizens. At the same time, China's real ecological footprint goes far beyond its own borders and reaches far corners of the world especially Africa, where many Chinese companies are engaged in intensive exploitation of various natural resources including oil, wood and precious metals (Mol, 2011).

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<A> A History Of Global Environmentalism And International Co-Operation For Sustainable Development

Early currents of modern environmentalism can be traced to the early 1960s when various movements, some of which were transnational in nature, campaigned to draw attention to the environmental hazards associated with nuclear energy. Many scholars (e.g., Rootes & Rootes, 2014; Dryzek, 2013) have linked global environmentalism to the rise of environmental movements in the US. The publication of *Silent Spring* by Rachel Carson in 1962 is often seen as in important landmark. Carson argued that uncontrolled and unexamined pesticide use in the United States, mostly DDT, was harming and killing animal populations (especially birds).

Furthermore, she stressed that through the process of **bioaccumulation**, dangerous amounts of pesticides were finding their ways into the human food chains and causing serious injuries to human lives. Carson was very critical of capitalism, which she said placed profit

above considerations of health and safety. She was also very critical of mainstream science which she said downplayed or completely ignored the risks and uncertainties associated with widespread pesticide use. Carson's book sparked a vociferous national debate not just about the safety of the use of a number of chemicals, but also the impact of Western industrialization throughout the world. In the end, the book prompted a reversal in the national pesticide policy, and motivated an environmental movement that engendered the establishment of the U.S. Environmental Protection Agency..

Another publication that had far reaching impact on the rise of global environmentalism was *The Limits to Growth* (Meadows et al., 1971). This book, which originated from research commissioned by the Club of Rome, painted an apocalyptic picture of famine, resource scarcity, hunger, ecosystem collapse, pollution and reduction in life expectancy, due to what it described as exponential increase in population and environmental degradation over the last 30 years. Like Carson before them, the authors were very critical of materialism and called for environmental regulation and greater emphasis on conversation at the global level.

It was in response to these currents of opinion for sustainable use of environmental resources that the United Nations (UN) organized the United Nations Conference on the Human Environment in 1972 in Stockholm. This was the first ever Conference on the Environment convened at the United Nations level. It had representatives from 113 countries, as well as from many international non-governmental organizations, intergovernmental organizations, and other specialized agencies in attendance (Egelston, 2013). A key product of the conference was the *Stockholm Declaration* containing 26 principles aimed at addressing the need to safeguard and improve the human environment. The document reflected on the development-environment nexus, including the idea that environmental protection is fundamental to good quality of life and the enjoyment of human rights; and that population growth and economic development pose considerable threat to environmental protection (Dodds, Strauss and Strong, 2012).

As a follow-up to the conference, the UN General Assembly established the *UN Environment Programme* (UNEP) in 1972. UNEP's core function, as outlined in the original mandate was to lead the UN's work on environment and its links to international development (see Chapter 10). In 1983, the UN Secretary General requested Dr. Gro Harlem Brundtland, the Norwegian Prime Minister and Public Health Specialist to chair a *Commission on Environment and Development.* The launch of the commission was sparked by a number of high profile environmental incidents around the world, including a severe drought in Africa that killed about a million people and endangered the livelihoods of 36 million people, and a leak from a pesticide factory in Bhopal, India, which killed more than 2,000 people and injured over 200,000 people. Also notable were an explosion of liquid gas tanks in Mexico City, which killed 1,000 and left thousands more homeless, and the Chernobyl nuclear reactor explosion, which sent nuclear fallout across Europe, increasing the risks of potential human cancers.

Following extensive consultations and meetings across all the continents, the Brundtland Commission published its pioneering report entitled '*Our Common Future*' in April 1987, which brought the term *'sustainable development'* firmly into public discourse. The report defines sustainable development as '*a development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs*' (Brundtland et al., 1987:43). It recommended that for sustainable development to be attained, 'societies need to meet human needs both by increasing productive potential and by ensuring equitable opportunities for all' (Brundtland et al., 1987:44). In their view, sustainable development required the utilization of resources, the arrangement of institutional structures, and the orientation of technology in a manner that fits and improves both current and future potential to meet human needs and aspirations (Ghai and Vivian, 2014; Lafferty and Eckerberg, 2013). Furthermore, the Brundtland Commission report cited ways of linking environment and development, and stressed the significance of considering the inter-relationship and inter-dependence of economic, environmental and social issues in framing and implementing

development policy decisions to address global environmental challenges (Chatterjee and Finger, 2014).

The 1980s saw some of the most influential advances in climate science and international response to global environmental change (Dryzek, 2013). For example, the *Vienna Convention* was agreed as a framework to protect the ozone layer in 1985, and the *Montreal Protocol* (a protocol to the Vienna Convention) in 1987 further protected the ozone layer by phasing out the production of substances that cause ozone depletion.

In 1992, the United Nations Conference on Environment and Development (UNCED), unofficially known as the Earth Summit, was organized in Rio de Janeiro, Brazil. Believed to be the biggest global environment conference ever, the key aim of UNCED was to reinforce the links between environment and development. The meeting produced 21 principles for actualizing sustainable development at the global level with Principle 4 asserting that 'environmental protection shall constitute an integral part of the development process and cannot be considered in isolation from it.' In addition, a more detailed blue print for the protection of the earth and its sustainable development at local levels, known as Agenda 21, was also adopted.

Agenda 21 had a wide-ranging focus, including decreasing deforestation, preventing pollution, alleviating poverty, promoting chemicals management and avoiding the depletion of natural resources. In full support of the objectives of Agenda 21, the UN General Assembly founded the *Commission on Sustainable Development* in 1992, as part of the Economic and Social Council. Furthermore, UNCED produced the *UN Convention on Biological Diversity* (UNCBD), the *UN Convention to Combat Desertification* (UNCCD), the *UN Framework Convention on Climate Change* (UNFCCC) and broad Principles on Forest Conservation. A number of global summits of sustainable development have been defined since the Rio Earth Summit. These include Rio+10 otherwise known as The *World Summit on Sustainable Development* in Johannesburg, South Africa in 2002 and more recently, Rio+20 on the theme of the **Green Economy** organized once again in Rio, Brazil.

<CATCH: Key Issues Box 17.3>

<A> Key Issues Box 17.2: Key Agreements In Sustainable Development History

1972: UNEP created by UN General Assembly

1973: Convention on International Trade in Endangered Species (CITES)

1979: Bonn Convention on Migratory Species

1985: Vienna Convention for the Protection of the Ozone Layer

1987: Montreal Protocol on Substances that Deplete the Ozone Layer

1988: Intergovernmental Panel on Climate Change (IPCC)

1992: UNCED publishes Agenda 21, a blueprint for sustainable development

1992: Convention on Biological Diversity

2000: Cartagena Protocol on Biosafety adopted to address issue of genetically modified organisms

2000: Millennium Declaration - environmental sustainability included as one of 8 MDGs

2001: Stockholm Convention on Persistent Organic Pollutants (POPs)

2010: Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)

2011: UNEP launches the Green Economy report in the context of sustainable development and poverty eradication key theme for Rio+20.

2015: The Paris Agreement adopted during the 21st Conference of the Parties of the UNFCCC in Paris

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<CATCH: Key Issues Box 17.4>

<A> Key Issues Box 17.2: The Post-2015 Sustainable Development Agenda

At the Rio+20 UN Conference on Sustainable Development in 2012, 17 Sustainable Development Goals (SDGs) were conceived, which were adopted in New York in September 2015. The SDGs build on the eight Millennium Development Goals (MDGs) that were established through a summit of the UN in 2000. Before the launch, the SDG process engaged governments, international organisations and the wider civil society to propose a universal sustainable development agenda, which is likely to extend until 2030. The groundwork also included the allocation of the task of developing a set of measurable indicators and targets to an intergovernmental Open Working Group (OWG). This 30-member group, established in January 2013, was assigned the responsibility of submitting a report to the UN General Assembly in September 2014, in which the focal areas above and how the interests of member countries align with them are discussed. Many member countries see the SDGs as an opportunity to address prevailing and potential sustainable development challenges. Nonetheless, a counter current has emerged, particularly in respect of ensuring that the SDGs don't end up largely unfunded like the MDGs Overall, a lot of hope is being expressed about the SDGs, with many member countries motivated by its promise to offer innovative and transformative approaches to achieving sustainable development, such as new and stronger global partnerships, capacity building and information sharing opportunities, and measures to improve accountability through effective monitoring and reporting (UN Sustainable Development Knowledge Platform- https://sustainabledevelopment.un.org/focussdgs.html).

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<A> CLIMATE CHANGE

The Earth's climate can be affected by natural elements that are external to the climate system, such as alterations in volcanic activity, solar output, and the Earth's orbit around the Sun. Of these, the two important issues on timescales of present-day climate change are changes in volcanic activity and changes in solar radiation. Climate change can also be caused by human

activities, such as the burning of fossil fuels and the conversion of land for agriculture and forestry. In addition to other environmental impacts, these activities change the land surface and emit various substances to the atmosphere such as Carbon (IV) Oxide- a **greenhouse gas**, which in turn can influence both the amount of inward and outward energy and thus, can have both warming and cooling effects on the climate.

Climate change exemplifies the intricate connections and tensions between global economic development and environmental sustainability perhaps more than any other environmental issue (Okereke and Schroder, 2009). There are at least three points of connection, all of which are of great significance. First, through its severe negative impacts on the natural, human, social and economic systems of developing countries, climate change could reverse decades of international development efforts and further limit the resources available to fight poverty in both rich and poor countries. . Some of the potential impacts of climate change in developing countries include increased frequency and severity of extreme climate events, reduced crop yield causing food insecurity, desertification, ecosystem collapse, fresh water shortages, lower incomes and scant economic growth, population displacement, and exposure to new health risks (IPCC, 2007; 2014).

Second, while large-scale economic development is needed to pull billions of citizens in developing countries out of abject poverty, a business-as-usual approach to development will exacerbate the problem of climate change with potentially irreversible long-term consequences (IPCC, 2014; IPCC, 2007). Furthermore, poverty contributes to environmental degradation and climate change, which in turn, increases poverty and underdevelopment – the so-called poverty trap (Okereke, 2014). A well-known example of this is the relationship between poverty, population growth and deforestation in developing countries. Third, climate change will considerably shape development choices in developing countries, where governments will need to jump to smarter technologies and more effective and resilient structures (Okereke and Yusuf, 2013). Hence, while climate change poses profound challenges to international development, it

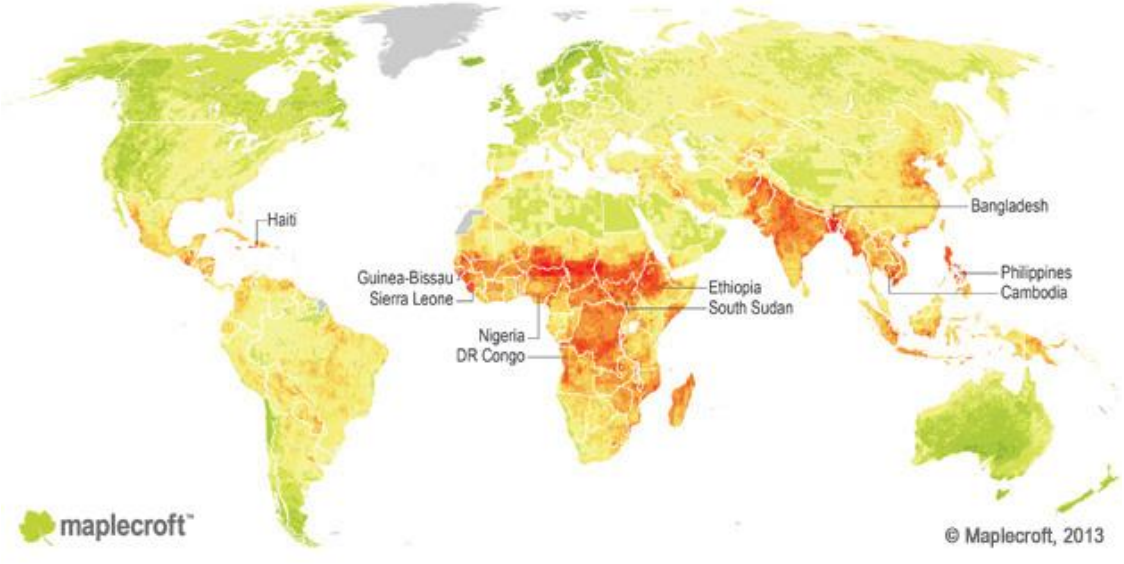
also offers unique opportunities to pursue growth and build more resilient economies.

A crucial dimension of climate change is that although its impact is and will be felt world over, its current and future impact will fall disproportionately on the world's poor populations who have contributed the least to the problem. The Climate Vulnerability Monitor (2012) indicates that climate change is already contributing to the deaths of nearly 400,000 people a year, 98% of which is occurring in poor countries especially in Africa. Available reports suggest that between 75 and 250 million people in Africa will be exposed to increased water stress triggered by climate change by 2020, which will significantly affect agricultural production, thus, increasing food insecurity and malnutrition (Kjellstrom, 2015).

These occurrences could increase the costs of adaptation to at least 5 to 10 percent of Africa's GDP (Tanner and Horn-Phathanothai, 2014). Furthermore, the Climate Change and Environmental Risk Atlas notes that the top 10 out of 193 countries that will be affected are in the third world. These countries include: Bangladesh (1st and most at risk), Guinea-Bissau (2nd), Sierra Leone (3rd), Haiti (4th), South Sudan (5th), Nigeria (6th), DR Congo (7th), Cambodia (8th), Philippines (9th) and Ethiopia (10th) (Maplecroft, 2013).

<CATCH: Figure 17.4>

<A> Figure 17.4 Climate Change and Environmental Risk Atlas



(Source: Maplecroft, 2013)

<CATCH: Current Events Box 17.4>

<A> Current Events Box 17.4 Counting The Costs Of Climate Change

A number of recent reports draw attention to the intricate links between the projected climate risks in developing countries and future state of the global economy. The *Maplecroft Climate Change and Environmental Risk Atlas* for example highlights the extent to which global economic growth is endangered by climate change. The 6th annual edition of the atlas discloses that by 2025, 31% of the economic yield world over, will be from countries recording 'high' or 'extreme risks' from the impacts of climate change. This forecast doubles current levels of climate change. A costing using a *Climate Change Vulnerability Index* (CCVI), which is a core part of the Atlas, shows that about 67 countries with a combined yield of $44 trillion will be severely affected by climate change. These estimates confirm that some of the countries upon whose growth the world currently depends like China, will be hit extremely hard by climate change, should present-day development practices in the public and private sectors go unchanged. In 10 more years beyond 2015, China and India are predicted to record an increase in their GDPs from current levels to $28 trillion and $5 trillion respectively, which will amount to nearly 23% of the world's economic output.

Equally, the situation is grim for most countries in Africa, including Nigeria, the region's largest economy. Drawing on recently released UN IPCC climate projections for the period up to 2040, it is clear that a significant warming of about 2^0C is projected for West Africa, which indicates an increase in rainfall and humidity and severe consequences for communities, governments and businesses. In the case of Nigeria, which is ranked the 6th most climate-

vulnerable country in the world according to the 2013 Maplecroft Climate Change Vulnerability Index (CCVI), climate change will mainly affect the oil sector and surrounding communities through erosion and sea level rise. Already, the impacts are being felt, with a flooding between July and November 2012 resulting in an estimated loss of 500,000 barrels-per-day in oil production, equal to more than one-fifth of the country's total production capacity (Maplecroft, 2013-

http://maplecroft.com/portfolio/new-analysis/2013/10/30/31-global-economic-output-forecast-face-high-or-extreme-climate-change-risks-2025-maplecroft-risk-atlas/)

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<B> The Climate Regime

Global effort to address climate change has focused on the United Nations Convention on Climate Change (UNFCCC) negotiated in 1992 as part of the UNCED. The Kyoto Protocol is a key component of the UNFCCC because it contains mandatory targets for emissions reduction for states, detailed measures for implementation and a compliance mechanism, which is the only one of its kind (Hovi, Stokke, and Ulfstein 2013). In December 2015, during the 21st Conference of the Parties of the UNFCCC in Paris, a new agreement designed to replace Kyoto was adopted (The Paris Agreement). It is intended that the Agreement will come into force in 2020. The Intergovernmental Panel on Climate Change (IPCC) provides crucial scientific evidence for climate policy. The IPCC was established in 1988 by the Executive Council of the World Meteorological Organization (WMO) and United Nations Environment Programme (UNEP) with the mandate to provide the world with a clear scientific view on the current state of knowledge in climate change and its potential environmental and socio-economic impacts. In the same year of its creation, the UN General Assembly endorsed the action by WMO and UNEP in jointly establishing the IPCC and called on the body to submit its first assessment report in time to feed into the United Nations Conference on the Environment and Development in 1992. Today, the

IPCC is the world's foremost institution for scientific research on climate change, with five 'assessment reports' to its credit, produced in 1990, 1995, 2001, 2007 and 2014.

The UNFCCC and Kyoto Protocol on their own part may well pass as the most elaborate and complex agreement the world has ever negotiated (Luterbacher and Sprinz, 2001). The regime embraces two main responses in its action against climate change. The first is **mitigation**, which focuses on the reduction of the amounts of greenhouse gas that states and other actors are emitting into the atmosphere. The second is **adaptation**, which focuses on how to cope with the impacts of climate change effects that cannot be mitigated. More recently, the concept of resilience considers adaptation as a process of coping with, responding to and recovering from climatic shocks and stresses has gained prominence (Bahadur, Ibrahim, and Tanner 2013). Mitigation and adaptation overlap, as the more climate change effects are mitigated, the less the prospect that individuals, communities and countries will need to adapt. Conversely, some efforts at adaptation such as planting trees can also help in mitigation.

Developing countries have consistently demanded an effective global response to climate change with emphasis on urgent and ambitious mitigation efforts by rich countries that are thought to be responsible for the course of climate change at least in historical terms. Second, they call for assistance in terms of finance, technology and capacity building to help them increase their adaptation to climate impacts. More recently, Low Carbon Development (LCD) and cognate terms like climate compatible development, Low Emission Development Strategies (LEDS), and green growth have all become popular terminologies in international environmental and sustainable development discourse. Their popularity has stemmed from the notion that they offer a new hope for continued growth in the South while also serving as a soft alternative to hard quantified GHG emission reduction targets for the developing countries (Nussbaumer, 2009). LCD is also attractive because it appears to hold the promise to reconcile a long and deep conflict between the economic development aspirations of developing countries and the imperative to cut anthropogenic global greenhouse gas emissions that are causing climate change. However, over

20 years since the negotiation of the UNFCCC, there remains a wide sense of frustration from developing countries that the rich countries are not only denying their obligations to reduce emissions and help poor countries adapt to climate change; but in fact, that they are surreptitiously conscripting developing countries into undertaking burdensome emission reduction commitments. The Paris agreement, which will come into effect in 2020 commits requests all countries (both developed and developing countries) to commit to ambitious emission reduction programmes.

<CATCH: Current Events Box 17.5>

<A> Current Events Box 17.5 Looking Ahead- A Post-2020 Climate Agreement

The overriding purpose of the 1997 Kyoto Protocol was to develop a long-term process for managing climate change including quantified emission reduction obligations from states. The first commitment period of Kyoto was 2008 to 2012. There are wide differences in opinion about how effective was Kyoto Protocol. Signatories to the UNFCCC meet every year in what is called the Conference of Parties meeting (COP) to negotiate on various aspects of the international climate agreement. Since 2005, there has been a series of negotiations about how to maintain momentum on climate action after the first commitment period of Kyoto. An agreement was supposed to be reached in Copenhagen (COP-15) in 2009, but this did not happen due to disagreements between states such as China and US. Since the failure in Copenhagen, much has been done to spark a renewed interest in UNFCCC-led negotiations, with the COPs in Cancun (2010), Durban (2011) and Doha (2012) seen as interventions to rebuild trust between developed and developing countries. Accordingly, in November 2015, an agreement to replace the Kyoto Protocol was signed at the Conference of Parties (COP 21) meeting in Paris, which will come into force in 2020 and provide a framework for long-term global action on climate change. The trust of the Paris Agreement is voluntary pledges of emission reductions from all countries called Indented Nationally Determined Contributions (INDCs) which will be submitted and reviewed

every five years. Despite widespread enthusiasm, some have expressed gave worries about building a hope for effective global emissions reductions on the voluntary pledges of states. There is a wide sentiment that the Paris Agreement does not provide enough support for developing countries to enable them take climate action with regards to mitigation and adaptation.

http://www.rff.org/Publications/Resources/Pages/185-Negotiating-a-Post-2020-Climate-Agreement.aspx

<End Box>

<B> Key Actors and Roles

Many actors, including UN agencies, other multilateral organisations such as the European Union, US Agency for International Development (USAID) etc., transnational public sector institutions and businesses, play crucial roles in global climate governance. For example, the climate change sub-programme at UNEP focuses on developing the capacity of institutions in developing countries to mainstream climate change decisions into national development strategies. These different strategies are principally linked to the broader UNFCCC framework for global climate governance. Nonetheless, recent developments in the climate regime have led to a renewed interest in multilateral and transnational partnerships outside the UNFCCC structure. These partnerships, such as the G8 and G8+5, largely seek to address climate issues outside the UNFCCC agenda, while others seek to demonstrate the crucial role multilateral institutions play in addressing global environment-development challenges (Green, 2012).

It could be that these responses are emerging in response to the failures of the UNFCCC to both regulate and stimulate the realization of emissions reductions or provide adequate funds for adaptation in developing countries (Morin and Orsini, 2014). Andonova and colleagues (2009) describe these partnerships in relation to three overlapping roles: information sharing; capacity building and implementation; and decision-making (Andonova, Betsill, and Bulkeley, 2009). The

main drive, as Bulkeley and Jordan (2012) note, is to outline their own priorities for addressing climate change accordingly (Bulkeley and Jordan, 2012). Conversely, while these partnerships seek to strengthen the UNFCCC process, others such as the *Asia-Pacific Partnership on Clean Development and Climate (APP)* created by President Bush after the withdrawal of the US from the Kyoto Protocol in 2005, enthusiastically wanted to build a parallel framework to the UNFCCC. Nevertheless, the *Major Economies Forum on Energy and Climate Change (MEF)*, which succeeded the APP, has been instrumental in relinking the parties with the UNFCCC (Tanner and Horn-Phathanothai, 2014).

<CATCH: Current Events Box 17.6>

<A> Current Events Box 17.6 Governing Climate Change: A Case Of The UNFCCC

The UN Framework Convention on Climate Change (UNFCCC) architecture involves 196 country parties, each with a focal point for representation and negotiations, usually located in a focal ministry dealing with environmental matters. Negotiations are also attended by bilateral and multilateral agencies such as the World Bank and United Nations agencies. The framework categorises country parties into three interlocking groups, namely: ANNEX 1 parties constituting countries of the Organisation for Economic Cooperation and Development (OECD), NON-ANNEX 1 parties comprised of the larger proportion of countries, including emerging industrialised economies, and ANNEX 2 parties solely including OECD countries with relevant international commitments. The UNFCCC is governed through a Conference of Parties (COP) that is comprised of representatives of country parties to the convention, who meet once a year. During negotiations, countries with common interests tend to form groups to save time and make stronger cases. These groups change however, depending on the issues being negotiated. Some prominent groupings under the UNFCCC include: the *Alliance of Small Island States* (AOSIS) comprised of 42 countries and observers; the *Least Developed Countries* (LDC) comprised of 48

country parties; the *African Group* with 53 members from Africa; the *EU Delegation* comprised of 28 countries of the European Union; and the Umbrella Group comprised of the United States, Russia, New Zealand, Canada etc.

<End Box>

Global climate deliberations have also led to an important set of public and private sector multinational responses, including: the *C40 Climate Leadership Group*, which is an association of 58 of the world's megacities; *the Asia Cities Climate Change Resilience Network (ACCCRN)* formed by the Rockefeller Foundation; and the *World Mayors Council on Climate Change (WMCCC)*, which seeks to connect industrialized and developing municipalities through an advocacy for city-based climate responses. In the private sector also, a number of consortia have been formed. A notable example is the *World Business Council of Sustainable Development (WBCSD)*, which works with 29 world leading companies from 14 industries to develop a vision 2050 that describes the ways by which a global population of 9 billion will live contentedly within the obtainable natural resource limits (Wilkinson and Mangalagiu, 2012). However many scholar have point out the irony of development agencies like World Bank and business organizations like WBCSD projecting themselves as leading actors in the efforts to address global environmental problems when in fact, these actors are actively engaged in activities (e.g., funding the development of dam and coal fired power station and exploiting tar sands) that cause environmental degradation (The Ecologist, 1987; Corten, 2001).

It is evident that a lot work is required by multiple actors and at multiscale to stem global environmental degradation and the seeming infectiveness of international institutions for environmental and sustainable development governance. Failures of global and country-level internal institutions to surmount the collective action challenge, and offer means through which countries, organisations and businesses can act together to address pressing challenges of poverty and environmental degradation remains a key global challenge of the 21st century.

<A> Controversies and Crosscutting Themes

<B> Environmental and Climate Justice

One major issue that has dogged international cooperative effort for global governance of climate change and sustainable development is the subject of equity and social justice. Contestations for climate justice mainly in the form of demands for fair treatment by poor countries have provoked the most vociferous debates and controversies between rich and poor countries in global sustainable development policy circles (Okereke, 2008; 2010). Concern for climate justice has been expressed in many forms. Firstly, poor countries are keen to point out that rich countries are responsible for, and have profited disproportionately from the bulk of the pollution that is causing today's global environmental problems. A good example is climate change where 25 countries account for 75% of historic global emissions (Bulkeley and Newell, 2015).

Second, poor countries point out that they bear a disproportionate burden of global environmental impacts arising from past and current global economic activities as a result of their geographical location, lack of protective infrastructure and low adaptive and response capacities. This would seem doubly unfair given as noted, that the rich countries have benefited and still tend to benefit more from these harm-producing activities due to their advantageous position in the global economic structure (Lewis, 2013). Third, poor countries fear that they are not able to participate effectively in the negotiation of global environmental agreements due to poor capacity and structural weaknesses (Okereke and Charlesworth, 2014). They insist that procedural justice is necessary to elaborate rules that are fair to all countries. Fourth, poor countries fear they may be saddled with responsibilities that could undermine their development aspirations. Again, to use climate change as an example, developing countries have pointed out that they have been forced into committing significant cuts in their own emissions, though they only contributed one-fifth of global emissions between 1850 and 2002 (World Bank, 2005).

Developed countries on their part, have argued that the fact of a rapidly deteriorating environment demands that all countries must make commitments and sacrifices to help facilitate an effective response (Chasek, Downie, and Brown, 2013). Moreover they argue that emphasis on historical responsibility for environmental and climate damage is unhelpful and point out that it is hardly justice to seek to punish sons for the sins of their fathers. Rich countries also often suggest that developing countries are the architect of their own poverty and vulnerability through several decades of corruption and poor governance (Rodrik, 2014).

A major equity concept that has been devised to mediate the justice conflict between developed and developing countries is the Common but Differentiated Responsibility and Capability Principle (CBDR+C). However, despite its popularity and frequent invocation in environmental agreements and policy circles, the CBDR+C principle has done little to satisfactorily resolve the deep moral impasse that characterises environmental and climate change bargaining (Okereke, 2008). Developing countries have so often focused on the 'differentiated' side of the norm, while developed countries tend to emphasise the 'common' side to highlight the need for equal commitment. The result is that while almost all major global environmental agreements negotiated since 1972 contain copious references to equity and justice, many developing countries feel they have made very little progress in securing real justice.

A major argument by developed countries often deployed in response to concerns for equity is that a focus on distributive justice especially in the form of North-South financial or technology transfer will undermine effective and efficient approaches to deal with climate change. For this reason developed countries insist that it is much better to use market approaches or instruments in dealing with environmental issues.

In contrast with earlier views that pursuing equality reduces economic efficiency, recent evidence suggests that extensive inequality hinders socio-economic growth, and addressing equity and social justice concerns can deliver fair and lasting development impacts (Acemoglu and Robinson, 2012). Additionally, it has been proposed that inequality in access to education and

other resources such as land, credit etc. can hamper economic growth, since the talents, ideas, views and experiences of a large proportion of the population are not wholly utilised (Leach et al., 2012).

Nonetheless, market approaches have dominated global environmental and sustainable development rule making, including policies like the Clean Development Mechanism that have been crafted as part of solutions for North-South distributive justice (Elah and Okereke, 2014). Through the *Clean Development Mechanism* (CDM), developing country parties request financial support to respond to climate change. Nevertheless, the mechanism is reported to have failed in providing broad-based socio-economic benefits (Boyd et al, 2007). It is also commonly assumed that CDM processes fail because of poorly defined objectives, as each country is expected to determine what comprises sustainable development benefits (Boyd et al, 2007). Additionally CDM has been viewed by most developing country parties as a way of taking the pressure off rich countries that need to make domestic cuts in emissions reductions, rather than buy their way out of local liability. In some critical literature, CDM has been referred to as a form of *carbon colonialism* (Bachram, 2004).

<B> What does Sustainability mean anyway?

Another major source of controversy that characterises global sustainable development polices stem from fundamental differences in the way the very concept of sustainability is understood by different sections of the global community**.** In its broadest sense, sustainability means the ability of any system to maintain its performance over time. Performance in this context refers to development in relation to the social and individual qualities of life (Tanner and Horn-Phathanothai, 2014). From these understandings, it can be supposed that sustainability is concerned with a 'development that lasts', which may require placing an emphasis on safeguarding natural resources (natural capital) that provide a range of services for humans and the environment, or substituting natural capital with other forms of produced capital. In effect, this is

a choice between weak sustainability and strong sustainability respectively (Dietz and Neumayer, 2007).

In respect of a weak sustainability paradigm, the understanding generally is that capital assets can substitute each other and the focus ought to be on the total stock of capital. Proponents of weak sustainability commonly assume that natural and produced capital are exchangeable, and that there are no inequalities in the kinds of well being they produce. Within this perspective, it is thought that it does not matter whether the current generation depletes non-renewable environmental resources, or continues to increase carbon emissions, as long as employment, technologies, and basic services are provided in return (Dietz and Neumayer, 2007). Obviously, a weak view of sustainability demands increased monetary compensation for environmental degradation and resulting conditions such as climate change. In contrast, advocates for a strong sustainability paradigm emphasise that some capital assets are more important than others, implying that others cannot substitute them. In their view, policies should be formulated to safeguard environmental resources upon which economic development primarily depends. Within this context, it can be observed that sustainability involves preserving and growing people's capital stock, with a focus on guiding the present generation through taking just as much as they need, so that the next generation will have as much as they would require (Tanner and Horn-Phathanothai, 2014).

<B> Driving forces behind environmental change

The impact of humans on the environment is generally measured using the equation ***I=PAT.*** Accordingly, the impact (I) of any population on the environment is expressed as a product of three characteristics: the population's size (P), its affluence (measured in per-capita consumption) (A), and the prevailing technologies in use (T). In short, impact (I) is calculated as a combined function of *population* (P), *affluence* (A) and *technology* (T).

While this seems simple and straightforward, there is a huge controversy, often reflecting differences in value, about the relative role of the various components and where emphasis should lie in designing global environmental policy. Simply stated, the controversy is often about whether the actual cause of environmental change is *population growth* in developing countries, or *power*, *affluence* and *use of technology* in the rich and developed countries. Developed countries often like to focus on the impact of population on the environment. They suggest that a key aspect of global sustainable development policy must include some measure of population control in developing countries. For example, it is projected that the next two decades will see unprecedented growth in urban populations, from three to five billion people, who will mostly live in developing countries. Furthermore, it is thought that growth in population is the major cause of the increasing demand for energy, which is expected to rise mainly in developing countries in few decades (Tanner and Horn-Phathanothai, 2014).

But developing countries often prefer to stress the role of affluence and technology as the main sources of the problem. They point out that most of this stress on the global environment comes from only 25 percent of the world's population, who consume 75 percent of global resources (forest, cement, paper, energy, precious metals, etc.). Because of technological growth and affluence, global electricity demand is projected to double by 2030 (from a 2004 baseline), should current consumption trends remain. Tied to this, is the rapid urbanisation and growth of cities, which accounts for 60 to 80 percent of global energy consumption (Kamal-Chaoui and Robert, 2009) (see Chapter 19).

The impact of technology on the environment is far more complex. On the one hand advances in technology have helped to stem environmental degradation. Common examples are renewable energy and innovative farming utilised in large-scale food production. On the other hand, advances in technology have made resource depletion much easier and quicker as evident in large-scale fish trawling in the oceans and deep-water oil exploration. Furthermore, technology has been considered a cause for widening the income inequality gap, as the rich are able to access

specialised and expensive equipment to grow their wealth at the expense of poor people, who only benefit from the wages they are paid for working on the rich men's farms (Milanovic, 2015).

<A> SUMMARY

The chapter has sought to make the case that global environmental challenges are now central concerns in international development discourse. Environmental issues and international development are now so intricately bound that it is not conceivable that these issues can be ignored in any major debate or academic work on development. This chapter lays out a foundation for understanding the intricate and complex relationship between climate change, environment and development. It presents the key historical and more recent developments in the environment, climate change and development nexus, and engages with the key debates, concepts, actors and institutions in the global governance of environment and sustainable development.

It was noted that while the global community has attempted to respond to these challenges by intensive co-operation marked by the creation of numerous institutions and policies, finding optimum options for balancing the need for environmental protection and economic growth especially in the context of global inequality remains a difficult challenge. It was noted that the main challenge in addressing environmental –development problems has to do with the intricate and paradoxical relationship between economic growth and environmental degradation as well as the fact that global environmental challenges as classical examples of the collective action problems. The chapter also highlights the roles of many other factors such as ideological differences between the developed and developed countries about the role of market in solving environmental challenges, the problem of agreeing what sustainability means in practice, and fundamental disagreements about how to resolve thorny issues of justice and fairness.

The above difficulties have been further illustrated by exploring the issue of climate change, which has been described as the greatest development challenge of the 21st century, with its impacts touching both present and future generations. The chapter shows that while despite wide acknowledgment of the need for urgent and organised response, the likelihood of achieving the level of cooperation required to ensure effective action remains in serious doubt. It is a huge ask for international politics marked by power and self-interested calculations of states as well as societal commitment to luxury and high levels of consumption to respond to the radical changes in behaviour, structure and systematic injustice required to address climate change. The chapter underscores the thesis that effective global governance of sustainable development appears to require radical changes in the global values as well as serious attention to questions of justice and fairness.

While there are edited volumes and books on different aspects of the link between environment and development, this chapter provides students with the insights and concepts required to understand and engage with a global debate that is fast evolving as a result of the challenges and choices presented by climate change. As this book is essentially about international development approaches, actors, issues and practice, this chapter presents the ways in which development choices conflict with or support arrangements oriented towards environmental protection, climate management and sustainable development.

<A> Discussion Questions

- Is environmental degradation an inevitable consequence of economic growth?
- Why is it so difficult for developed and developing countries to agree on just and equitable policies for the pursuit of global sustainable development?
- What obligations if any do rich countries owe the poorer ones for the damages caused by climate change?

- Discuss the relative impact of population, affluence and technology on environmental pollution.

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<A>Related Websites

- www.newsroom.unfccc.int
- http://www.unep.org/climatechange/
- www.ipcc.ch

GLOSSARY

Adaptation: Action that helps cope with the effects of climate change - for example construction of barriers to protect against rising sea levels.

Bioaccumulation: The accumulation of substances, such as pesticides, or other chemicals in an organism, occuring when an organism absorbs a toxic substance at a rate greater than that at which the substance is lost.

Climate change: A pattern of change affecting global or regional climate, as measured by yardsticks such as average temperature and rainfall, or an alteration in frequency of extreme weather conditions. Both natural processes and human activity may cause this variation.

Common pool resources: A common-pool resource (CPR), also called a common property resource, is a type of good consisting of a natural or human-made resource system (e.g. a community forest, or fishing ground), whose size or characteristics makes it difficult, but not impossible, to define recognised users and exclude other users altogether.

Green economy: An economy that results in reducing environmental risks and ecological scarcities, and that aims for sustainable development without degrading the environment.

Greenhouse gases (GHGs): Natural and industrial gases that trap heat from the Earth and warm the surface. The Kyoto Protocol restricts emissions of six greenhouse gases: natural (carbon dioxide, nitrous oxide, and methane) and industrial (perfluorocarbons, hydrofluorocarbons, and sulphur hexafluoride).

Mitigation: Action that will reduce man-made climate change. This includes action to reduce greenhouse gas emissions or absorb greenhouse gases in the atmosphere.

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