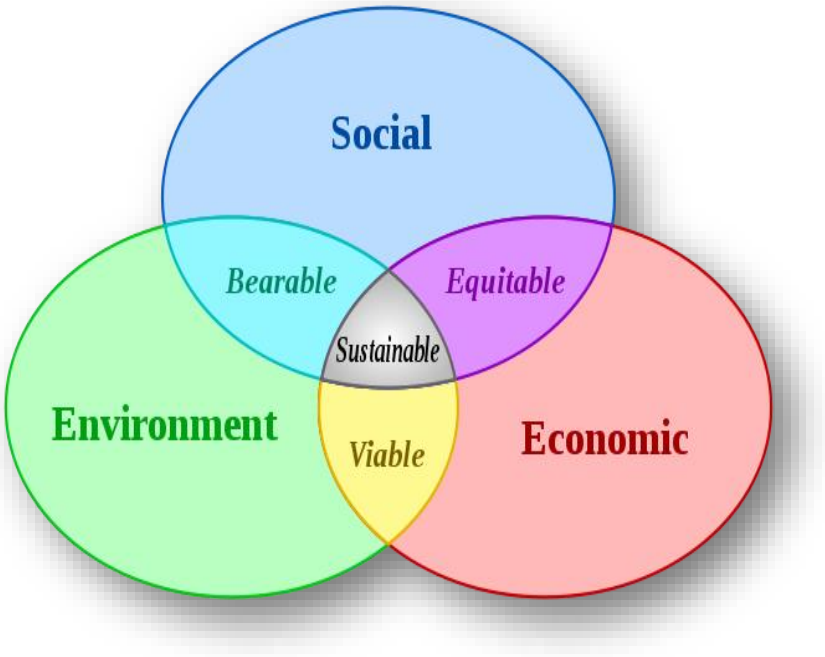
DEBARK UNIVERSITY

COLLEGE OF SOCIAL SCIENCE

DEPARTMENT OF GEOGRAPHY AND ENVIRONMENTAL STUDIES

COURSE TITILE: ENVIRONMENT AND SUSTAINABLE DEVELOPMENT



CHAPTER ONE: ENVIRONMENT

1.1 The Concept of Environment

The word environment has been around for a long period of time but the importance and usage of the word has increased dramatically over the last half a century or so. Traditionally it has been used to describe the surroundings in which an organism lives. The term 'ecology' is also used as a surrogate for 'environment', although strictly speaking it is the study of the relationship between living organism and their environment. The relationship is a two way street: **environment** and **organisms** affect each other. Hence, the relationship is highly reciprocal.

Environment can simply be defined as: *the development at any level of a general notion of the surrounding ecosystem, its foundational relationship to human life and the need to preserve its integrity.*

Furthermore, environment can be defined as:

- The sum total of the physical and biological factors that directly influence the survival, growth, development and reproduction of organisms.
- The sum total of substances or forces external to organism in such a way that it affects the organism's existence.
- It refers to all of the external factors affecting an organism.
- It is a multidimensional system of complex relationships in a continuing state of change.

1.2 Different types of environment and their characteristics

It is said that environment refers to a unique set of external factors that influence the life of an organism. These factors may be other living organisms (biotic factors) and non-living variables (physical/abiotic/ factors).

I. Biotic Components of the environment

Biotic components of the environment constitute all the living members of an ecosystem. The different components are connected through **food** and a number of other **relations**. Food is *a*

group of materials that contain energy and all the essential ingredients required for body building, growth and body functions. Both **matter** and **energy** are transferred any living world through **food**. Food is manufactured from inorganic materials by **autotrophs** only. Autotrophs are, therefore, also called **producers**. Other organisms which cannot manufacture their organic food are called **heterotrophs**. Heterotrophs are of two main types, **consumers** (herbivores and carnivores), and **decomposers**.

1. **Producers (autotrophs)**. They are photosynthetic or autotrophic plants which are *able to synthesize organic food from inorganic raw materials with the help of solar radiations*. The process is called **photosynthesis**. Energy contained in solar radiations is first changed into chemical form by chlorophyll of photosynthetic plants. This chemical energy is then used in bold building of organic compounds. The energy can be released when the bonds of the organic compound are broken down as during respiration. All other organisms depend up on the producers for their supply of organic compounds or food.

2. **Consumers (Heterotrophs)**. They are *animals which feed on other organisms or their part*. Consumers **ingest their food**. Consumers are differentiated into two broad categories, **herbivores** and **carnivores**. Herbivores obtain their food (and energy) directly from plants. They are called first order consumers.

Carnivores ingest or prey up on other animals. The carnivores which feed on herbivores are named as **primary carnivores** or **secondary consumers**. The animals which feed on primary carnivores are called **secondary carnivores** or third **order consumers**. Secondary carnivores may become food of tertiary carnivores and so on. The carnivores, which cannot be preyed up on further, lie at the top of food chain, are termed as **top carnivores**.

3. **Decomposers**. These are saprotrophic micro-organisms which **feed on dead bodies** of organisms and **organic wastes** of living organisms. The decomposer organisms secrete digestive enzymes to digest the organic matter externally. The digested form of organic matter is partly absorbed by micro-organisms for their own assimilation. The remaining adds raw materials and minerals back into substratum. The phenomenon is called **mineralization**.

Decomposers are also called reducers because they are able to remove or degrade the dead bodies of organisms. Because of their small size, they are known as **micro consumers**.

Sometimes in the biotic components of an ecosystem two more categories of **decomposers** can be distinguished. They are **detrivores** and **parasites**. Every type of living being can be attacked by parasites. **Detrivores** or **scavengers** are animals which feed on dead bodies of other organisms. They are helpful in quick disposal of the dead bodies.

II. Abiotic components of the environment

Abiotic components of an ecosystem consist of non-living substances and factors. They comprise of **climatic** and **edaphic** factors.

Climatic factors

Temperature: - Organisms generally live in a *narrow range of temperature* (5 - 35˚C) with the exception of spores, seeds, some prokaryotes and other low organized individuals. The latter can be found in hot springs (60˚C - 90˚C) or permafrost (–30˚C to –50˚C).

Light: - Light *intensity*, *quality* and *duration* control the structure, growth and activities of organisms. It affects *photosynthesis*, *productivity*, *growth*, *pigmentation*, and *animal activity.*

Four categories of animals can be distinguished depending on their activeness in a different period of the day:-

a) ***Diurnal-active*** during the day e.g. Butterflies, crow, cattle, pigeon, sparrow,

b) ***Nocturnal- active*** at night, e.g. moths, owl, bat, cockroach,

c) ***Aurora-active*** at dawn only, and

d) ***Vesperal- active*** at dusk only, e.g. Rabbit, plant movement, flowering, animal breeding.

Wind: - It affects **pollination**, **dispersal** (of seed, spore, eggs and small animals), *flight animals* (They are rare in areas where there is high speed wind), transpiration, soil erosion, weather conditions.

Humidity: - It affects formation of clouds, fog, dew, etc.

Precipitation: - It affects the distribution of both plants and animals.

Gases: - e.g. CO_2 concentration is always a limiting factor for photosynthesis.

Edaphic factors: - include soil, pH (hydrogen ion concentration), topography and mineral elements.

1.3 Man-Environment Relationship

Man's **biological** and **cultural** evolution is intimately tied to the interaction between him and his natural environment. The natural environment is man's sole material base for the creation of material wealth.

- *The objective of this interaction is to satisfy man's increasing needs.*

The role of man in this interaction was understood differently at different times. The popular concepts used to designate man-environment interaction in the late 19^{th} and early 20^{th} centuries in geography and anthropology are:

- environmental determinism,
- environmental possibilism,
- environmental probabilism and
- environmentalism
- environmental perception
- environmental culture
- environmental education
- environmentalism

Environmental determinism: -

Environmental determinists advocated that human actions were controlled by the natural environment. Environment wholly determines the activity of man. Environment is considered as **master** while man is **slave**. Exponents of the idea say that, *man is not only the child of the earth but also dust of her dust*. Thus, environmental determinism relegated

man to, essentially, a **passive role**. In environmental determinism, there is, therefore, one way relationship.

This view was in imitation to the Darwin's theory of the evolution of life- "*The fittest will survive-Natural selection".* Some critics labeled it as **social Darwinism** that served to legitimize imperialism as a necessary stage in the evolution to a higher order of existence.

As time passed, it became evident that environmental determinism *neither matched with reality nor was it theoretically tenable*. A way out from this impasse (bottleneck) was to substitute environmental determinism with its *antithesis* or milder terms like; environmental possibilism, environmental probabilism.

Environmental possibilism: -

Environmental possibilism was meant to refer to the idea that the *physical environment was passive*; man being the active agent was at *liberty to choose between wide ranges of environmental possibilities.* Man, being active, can transform or modify nature through **science and technology**. Nature doesn't direct him in one direction, rather offers a number of opportunities.

This was the antithesis of environmental determinism which *implicitly suggested a complete disregard of environmental factors in the socio-economic development efforts*. To some writers environmental possibilism is *neither a denial nor a confirmation* of environmental determinism. It is an extension of the concept of environment factor from the limited natural one to that conceived broadly to include socio cultural elements. Thus, an intermediate term being desirable, environmental probabilism came into use.

Environmental Probabilism:

It meant that though the environment doesn't necessarily determine human action, *it makes some development or patterns probable and others unlikely under a given socioeconomic conditions*. Environmental probabilism saved the environmental factors from being

discarded completely in development considerations though its explanatory role was reduced to insignificance.

Environmentalism: -

It embraces all the shades of meanings cited above. It tries to *provide a balance on the roles of man and environment* on each another. Furthermore, Environmentalism covers a number of issues such as;

1) Concern for the environment and its protection

2) It is a theory emphasizing the primary influence of the environment on the development of groups or individuals. It stresses the importance of the physical, biological, psychological, or cultural environment as a factor influencing the structure or behavior of animals, including humans. In politics, this has given rise in many countries to **Green Parties**, which aim to “Preserve the planet and its people".

Environmental perception

This is an intuitive recognition or understanding of the ecosystem and its natural resources, often based on human experiences or cultural attitudes or beliefs.

Environmental culture

This involves the total of learned behavior, attitudes, practices and knowledge that a society has with respect to maintaining or protecting its natural resources, the ecosystem and all other external conditions affecting human life.

Environmental education

This is an educational process that deals with the human interrelationships with the environment and that utilizes an interdisciplinary problem-solving approach with value clarification. It is concerned with education progress of knowledge, understanding, attitudes, skills, and commitment for environmental problems and considerations. The need for

environmental education is continuous, because each new generation needs to learn conservation for itself.

1.4 Major environmental problems

The problems facing the environment are vast and diverse. Some of the major problems include: global warming, the depletion of the ozone layer in the atmosphere, air pollution, water pollution, species extinction, environmental racism, etc.

1.4.1 Global Warming:

Global warming refers to the increase in the average temperature of the earths near surface and oceans temperature in the recent years. Within the last century, the average global temperature has increased by about 0.6° Celsius (1° Fahrenheit). This increment may seem small but during the last ice age the global temperature was only 2.2° Celsius (4° Fahrenheit) cooler than it is presently.

1.4.1.1 Causes of global warming

Almost all of the observed temperature increase over the last 50 years has been due to the increase in the atmosphere of the greenhouse gas concentrations like water vapour, CO_2, methane, chlorofluorocarbons (CFCs) and nitric oxide. The largest source of greenhouse gases is burning of fossil fuels leading to the emission of CO_2. Carbon dioxide is the most important of the greenhouse gases, contributing about 60% of the total greenhouse effect.

Many scholars agree that there are three ways to reduce CO_2 emissions:

- Increasing energy efficiency
- Switching to non-carbon fuels
- Taking carbon out of the atmosphere –through afforestation and reforestation

Greenhouse gases have greenhouse effect. Greenhouse effect refers to the effect of greenhouse gases which allow short wave solar radiation to reach the earth but retain outgoing long wave radiation, which causes warming of the atmosphere and oceans.

1.4.1.2 Consequences of global warming

Global warming may result in either of the following adverse effects on the environment;

- Melting of polar ice
- Sea level rise - flooding of low lying areas
- Frequency of severe storms and drought increase (extreme weather condition)
- plant and animal species extinction
- Change in global wind patterns
- Disruption of agriculture
- Ecological imbalance

1.4.2 Depletion of the Ozone Layer

Ozone is a form of oxygen (O3), very faintly blue in colour, found in greatest quantities at a height of 20-25 km in the Earth's atmosphere. Ozone is believed to result from photochemical changes through the absorption of ultraviolet radiation by oxygen. Indeed, the ozone layer acts as a filter, protecting the lower atmosphere and ground surface from potentially harmful ultraviolet rays. Recent research has shown that concentrations of ozone in the ozone layer are being seriously depleted, largely as a result of the build-up in the atmosphere of chlorofluorocarbons (CFCs) from sources such as domestic refrigerators and aerosol spray cans. So-called 'holes' in the layer have been discovered, first over Antarctica and, more recently, over the North Pole.

The layer is thinning because the ozone is being destroyed at the faster rate than it is being regenerated by natural force.

Chlorofluorocarbons (CFCs) are chemicals used in:

- refrigeration,

- ❖ air-conditioning systems,
- ❖ cleaning solvents, and
- ❖ aerosol sprays

CFCs release chlorine into the atmosphere; chlorine, in turn, breaks down ozone molecules. Because chlorine is not affected by its interaction with ozone, each chlorine molecule has the ability to destroy a large amount of ozone for an extended period of time. Other chemicals, such as bromine halocarbons, as well as nitrous oxides from fertilizers, may also attack the ozone layer.

1.4.2.1 Consequences of depletion of the ozone layer

Recently, depletion of the ozone layer has begun to affect even parts of Europe and N. America, giving rise to fears concerning possible adverse effects on human health (e.g. an increased incidence of ultraviolet radiation).

- This would in turn lead to:
  - Increase incidents of skin cancers and cataracts
  - Reduce the ability of immune systems to respond to infection
  - Decline of the growth of the world's oceanic plankton, the base of most marine food chains and contains photosynthetic organisms that break down carbon dioxide.

If plankton populations decline, it may lead to increased carbon dioxide levels in the atmosphere and thus to global warming. Recent studies suggest that global warming, in turn, may increase the amount of ozone destroyed.

1.4.3 Air Pollution

Air pollution refers to introduction into the atmosphere of substances that are not normally present therein and that have a harmful effect on human beings, animals, or plant life.

A significant portion of industry and transportation burns fossil fuels. When these fuels burn, chemicals and particulate matter are released into the atmosphere.

Although a vast number of substances contribute to air pollution, the most common air pollutants contain *carbon*, *sulfur,* and *nitrogen*. These chemicals interact with one another and with *ultraviolet radiation* in sunlight in dangerous ways.

Example, acid rain forms when sulfur dioxide and nitrous oxide transform into sulfuric acid and nitric acid in the atmosphere and come back to Earth in the form of precipitation.

- Acid rain has made numerous lakes so acidic that they no longer support fish populations.
- Acid rain is also responsible for the decline of many forest ecosystems worldwide.

1.4.4 Water Pollution

Estimates suggest that nearly 1.5 billion people worldwide lack safe drinking water and that at least 5 million deaths per year can be attributed to waterborne diseases. Water pollution may come from *point sources* or *nonpoint sources*.

Point sources of pollution: *discharge pollutants from specific locations,* such as:

- Factories,
- Sewage treatment plants, and
- Oil tankers.

This type of pollution is relatively easier to control than non-point source pollution.

Non point sources of pollution:

As the name indicates the sources of pollution are not specific points. These sources include:

- farm land
- vehicles
- land fills

Pollution from non-point sources occurs when rainfall or snowmelt moves over and through the ground. As the runoff moves, it picks up and carries away pollutants, such as *pesticides* and

fertilizers, depositing the pollutants into lakes, rivers, wetlands, coastal waters, and even underground sources of drinking water.

Non point sources of pollution are difficult to control.

1.4.5 Groundwater Depletion and Contamination

Water that collects beneath the ground is called groundwater. Worldwide, groundwater is 40 times more abundant than freshwater in streams and lakes. Although groundwater is a renewable resource, reserves replenish relatively slowly.

- Presently, groundwater in the United States is withdrawn approximately four times faster than it is naturally replaced.
- When groundwater is depleted in coastal areas, oceanic salt waste intrudes to freshwater supplies.
- In addition to groundwater depletion, scientists worry about groundwater contamination, which arises from:
    - Leaking underground storage tanks,
    - Poorly designed industrial waste ponds, and
    - Seepage from the deep-well injection of hazardous wastes into underground geologic formations.

1.4.6 Habitat Destruction and Loss of Biodiversity

The term biological diversity refers to the variety of species, both flora and/or fauna, contained within an ecosystem. It broadly refers to *the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems.* Some ecosystems (such as a ***tropical rainforest***) are characterized by very high biodiversity, while others (such as ***boreal forest***) have much lower biodiversity. A serious human impact on many ecosystems has been to reduce biodiversity through the extermination of species; the growing number of endangered species threatens to reduce biodiversity still further.

- The range of biological diversity varies in different parts of the planet according to the climatic conditions.
- The greatest diversity is to be found, on the land and in the sea, within the humid tropical regions. Tropical forests contain at least half of the world's species.

However, plant and animal species are dying out at an unprecedented rate. Over the past 50 years, humans have changed ecosystems more rapidly and extensively than in any comparable period of time in human history, largely to meet rapidly growing demands for food, fresh water, timber, fiber, and fuel. This has resulted in a substantial and largely irreversible loss in the diversity of life on Earth. Annual rate of extinction ranges from 4,000 to 50,000 species per year.

- The leading cause of extinction is habitat destruction, particularly of the world's richest ecosystems - *tropical rain* forests and *coral reefs*. *Coral reefs-ridge or elevated part of relatively shallow sea floor. They represent the most complex aquatic ecosystem found on earth*. A large coral reef running parallel to the coastline, from which it is separated by an extensive lagoon. The most famous example is the Great Barrier Reef of E. Australia, which extends for over 2000 km.

Habitants are destructed for many reasons like:

- Land is cleared for farming, industrial development, urban settlements and so on,
- Pollution is another cause. Aquatic life, both in the oceans and in waters of highly populated and industrial regions, is particularly at risk.
    - Acidification of lakes and rivers has also become a serious problem.
- The world's *natural wetlands are also disappearing* as they are increasingly being drained for agricultural purposes.
- Over exploitation of species is also another factor leading to species extinction. Through activities such as hunting, fishing, whaling and lumbering.

- Modern farming is also responsible for species reduction. As farming has become more commercialized there has been a concentration on a smaller number of varieties of crops and animals, and greater emphasis on large-scale monoculture.

Effects of loss of biodiversity

The loss of biological diversity causes a rapid loss of ecosystems and triggers extinctions of species and local populations. The current rate of extinction is sometimes considered a mass extinction, with current species extinction rates on the order of 100 to 1000 times as high as in the past (Global Issues, 2011).

Furthermore, the following are some common effects of loss of biodiversity.

- the loss of basic necessities for life, such as:
  - loss of food from fishing grounds, and
  - loss of timber from forests as well as other valuable products such as waxes, resins, fibers and chemicals
- Loss of medical plants- Many drugs now produced synthetically originated from plants.
- Lost opportunities for disease control and improved yields
  - This is because all cultivated plants and domesticated animals originated from wild species. It is therefore vital to protect and maintain wild species in order to continue breeding new improved varieties and for the resuscitation of exhausted domesticated species.
- Loss of opportunities for the future developments in biotechnology and genetic engineering. This is because large reserves of genetic material will be needed for the future developments in biotechnology and genetic engineering.

  - ***Biotechnology*** *is a generic term for those technologies that use living organisms (or their parts) to modify existing life forms to generate new ones. Also included*

*in biotechnology is the technology of **genetic engineering**, which involves the transfer of genes between unrelated species.*

- Expansion of deserts
- Loss of aesthetic values and cultural values.

Biological diversity is by itself beautiful, inspiring and enriches our spiritual life. This important issue, with its resulting loss of biodiversity, requires a much greater responsibility on the part of governments and multinational corporations. It also needs internationally agreed conservation programmes and a fundamental reappraisal of the relationship between the human species and the natural world.

These ecological effects of biodiversity in turn affect both climate change through enhanced greenhouse gases, aerosols and loss of land cover, and as explained in the UN's 3rd Global Biodiversity Outlook, (Global Issues, 2011) the rate of biodiversity loss has not been reduced because the 5 principal pressures on biodiversity are persistent, even intensifying:

1. Habitat loss and degradation
2. Climate change
3. Excessive nutrient load and other forms of pollution
4. Over-exploitation and unsustainable use
5. Invasive alien species

1.4.7 Environmental Racism

Evidences have shown that not all individuals are equally exposed to pollution. For example, toxic-waste sites are more prevalent in poorer communities.

Thus, racism is involved in the selection of sites for hazardous waste disposal.

- Environmental racism takes international forms as well. Dangerous chemicals banned in USA often continue to be produced and shipped them to developing countries.
- Additionally, the developed world has shipped large amounts of toxic waste to developing countries for less-than-safe disposal.

1.5 Environmental Movements

The **environmental movement** is a diverse scientific, social, and political movement for addressing the concerns of environmentalism. Environmentalists advocate the sustainable management of resources and stewardship of the natural environment through changes in public policy and individual behavior. Thus, environmentalism is defined as a movement to protect the quality and continuity of life through conservation of natural resources, prevention of pollution and control of land use.

- ***Environmentalism*** *(sometimes 'ecologism')* is a broad philosophical and social movement centered on a concern for the conservation and improvement of the natural environment, both for its own sake as well as its importance to civilization.
- ***Stewardship*** is used in a more general way to refer to a personal responsibility to take care of something one does not own.
- ***Environmental stewardship*** is the responsibility to take care of our natural resources to ensure that they are sustainably managed for current and future generations.
    - Can include recycling, conservation, regeneration, and restoration.
    - May have a religious connotation for some people, as people should be 'stewards of God's earth, and it is in their duty to respect His creatures'.

1.5.1 The Emergence of Environmental movements

Man gradually got the upper hand in the complex man-environment interaction. His impact on the natural environment has increased with time according to two trends:

1. Man's numerical increase has resulted in overall exploitation of the natural environment.

2. Man’s scientific, technological and organizational growth progressively increased his per capita impact on the same.
    - Moreover, a massive misuse of the natural resources also accompanied the increased exploitation.

During the 1950s, 1960s, and 1970s, several events illustrated the magnitude of environmental damage caused by man. Some of these events include:

- In 1954, the 23 man crew of the Japanese fishing vessel Lucky Dragon was exposed to radioactive fallout from a hydrogen bomb test.
- In 1962 the publication of the book **Silent Spring** by Rachel Carson drew attention to the impact of chemicals on the natural environment.
- The 1967 wreck (damage) of the oil tanker Torrey Canyon devastated the marine environment off the coast of Great Britain.
- In 1969 oil spilled from an offshore well in California's Santa Barbara Channel.

At the same time, emerging scientific research drew new attention to existing and hypothetical threats to the environment and humanity. One of these was the work of Paul R. Ehrlich, whose book *The Population Bomb*, published 1968, revived concerns about the impact of exponential population growth.

All these events and impacts aroused awareness among a wide range of people, mainly in the developed world, culminating in waves of protests. At its broadest sense, the movement includes private citizens, professionals, religious devotees, politicians, and environmental extremists.

- Environmental activists started to organize themselves to protect the environment to make it healthy and lasting.
- Environmental activists were against the overexploitations of the tropical forests, soil degradation, the pollution of the atmosphere and water, global warming, etc.

- Most scientists agree that if pollution and other environmental deterrents continue at the current rates, the result will be irreversible damage to the ecological cycles and balances in nature up on which all life depends.

The environmental movement is motivated and united by the common beliefs:

1. we must protect the environment for ourselves and for future generations;
2. the world's plants and animals have as much right to exist as humans do;
3. people in the world's richest countries (including the U.S.) must reduce their consumption and waste; and
4. people in developing nations (including China) must find more environmentally sustainable ways to industrialize and raise their standard of living, so that they do not repeat the mistakes of the U.S. and other rich countries

Why the U.S., China, and the business community must take the lead

- The U.S. has about 5 percent of the world's population, but it's responsible for 25 percent of the world's total carbon emissions so far.
- China must also change the path that it is on. China is the world's leading producer and consumer of coal. Coal accounts for roughly two-thirds of China's fossil-fuel consumption. Coal-burning is also the biggest source of China's carbon emissions. Because coal is such a big source of carbon. China has become the world's largest carbon emitter recently. Thus, China and the US have both accounted for about 41 percent of global CO_2 emissions in 2008.

Table 1. Ranking of the World's Countries by 2008 total CO_2 emissions from fossil-fuel burning, cement production, and gas

S.N	Nation	Emissions expressed in thousand metric tons of carbon (CO2_TOT)	Percentage of global total
1	CHINA (MAINLAND)	1917621	23.35

2	UNITED STATES OF AMERICA	1489232	18.13
3	INDIA	475238	5.79
4	RUSSIAN FEDERATION	465954	5.67
5	JAPAN	329469	4.01
6	GERMANY	214524	2.61
7	CANADA	148375	1.81
8	ISLAMIC REPUBLIC OF IRAN	146824	1.79
9	UNITED KINGDOM	142584	1.74
10	REPUBLIC OF KOREA	138852	1.69

Source: (Carbon Dioxide Information Analysis Center, 2008)

The world's large corporations have played a major role in creating the problem of climate change, and they must also help solve it.

- They produce the coal, oil, and gas.
- They build the power plants, automobiles, home boilers, office buildings, and homes that use the fuel.
- They profit from all of these activities, but many of them don't want to pay the cost to make our fuels, transportation, homes, and offices more climate-friendly.

The environmental movement is deeply concerned about the growing problem of climate change. The impact of climate change on this generation may be small, but we have a responsibility to our grandchildren to begin solving the problem that we created.

- Do we want them to inherit a world where storms, floods, and droughts make life even more miserable for many of the world's poorest people? Where even the rich cannot escape the misery of burning heat waves and rising seas that wash away thousands of miles of coastal land each year?

We have the power to protect the global climate and reduce the risks that we pass on to future generations.

1.5.2 Environmental Movements in the United States

The environmental movement in the United States can be traced back to the 19thcentury New England philosophical movement called transcendentalism (in philosophy and literature, belief in higher reality than that found in sense experience), whose leaders included the poet and essayist Ralph Waldo Emerson and the naturalist and author Henry David Thoreau. In their writings, both men expressed a reverence for the natural world, believing that humans and nature shared a divine spirit. Thoreau, more protective and pessimistic, has been quoted as saying, *"Thank God, men cannot yet fly and lay waste the sky as well as the earth."*

In the early 20th century, U.S. president Theodore Roosevelt greatly expanded both the national forest and national park systems and created a system of national wildlife refuges and appointed forestry expert.

In 1962 in her book Silent Spring, American biologist Rachel Carson warned of the grave dangers posed by the indiscriminate use of dichlorodiphenyltrichloroethane (DDT) and related pesticides. The book's title suggested a time when birds, their populations greatly reduced by pesticides, could no longer be heard singing in the spring.

- Carson, by arguing that humans as well as wildlife were at risk, issued a call to action.
- The publication of this a wonderfully poetic style book moved people to a new level of environmental awareness and activism.

By the late 1960s environmental awareness had become much more commonplace. Numerous grassroots environmental organizations were established to work for political change, including:

- the Environmental Defense Fund in 1967 (now known as Environmental Defense),
- Friends of the Earth in 1968,
- the Natural Resources Defense Council in 1970, and

On April 22, 1970, the first Earth Day, approximately 20 million Americans gathered at various sites across the country to protest corporate and governmental abuse of the environment.

These environmental movements yielded dramatic changes in American legislation and reflected an expanded set of priorities.

- In 1964 -Wilderness Act
- In 1968 -the Wild and Scenic Rivers Act
    - To ensure that at least some of the scenic and recreational value of the country's rivers was preserved in the face of a growing number of dams and riverside development.
- In 1970-etstablishment of Environmental Protection Agency (EPA)
    - It focused on pollution control and the establishment of national environmental quality standards.

- The Clean Air Act of 1970- established national air-quality standards.
- In 1972 -the Clean Water Act
- In 1973- the Endangered Species Act

1.5.3 The Environmental Movement in the Global South:

The developing world's stance towards the question of the environment has often been equated with the confrontational comments of former Malaysian Prime Minister Mohamad Mahathir, such as his famous lines at the **Rio** Conference on the Environment and Development in June 1992.

When the rich chopped down their own forests, built their poison-belching factories and scoured the world for cheap resources, the poor said nothing. Indeed they paid for the development of the rich. Now the rich claim a right to regulate the development of the poor countries…As colonies we were exploited. Now as independent nations we are to be equally exploited.

Mahathir has been interpreted in the North as speaking for a South that seeks to catch up whatever the cost and where the environmental movement is weak or non-existent. Today, China is seen as the prime exemplar of this Mahathirian passion with rapid industrialization with minimal regard for the environment.

1.5.4 National Elites and Third Worldism

It is the national elites that spout the ultra-Third Worldist line that the South has yet to fulfill its quota of polluting the world while North has exceeded its quota. It is they who call for an exemption of the big rapidly industrializing countries from mandatory limits on the emission of greenhouse gases under a new Kyoto Protocol. When the Bush administration says it will not respect the Kyoto Protocol because it does not bind China and India, and the Chinese and Indian governments say they will not tolerate curbs on their greenhouse gas emissions because the US has not ratified Kyoto.

1.5.5 Emergence of the Environmental Movement in the NICs

Among the most advanced environmental movements are those in Korea and Taiwan, which were once known as "Newly Industrializing Countries" (NICs). This should not be surprising since the process of rapid industrialization in these two societies from 1965 to 1990 took place with few environmental controls, if any.

- E.g. Seoul achieved the distinction in 1978 of being the city with the highest content of sulphuric dioxide in the air.

In both societies, farmers, workers, and the environment bore the costs of high-speed industrialization. Both societies, it is not surprising, see the emergence of an environmental movement that was spontaneous, that drew participants from different classes that saw environmental demands linked with issues of employment, occupational health, and agricultural crisis, and that was quite militant.

In both societies, the environmental movements were able to force government to come out with restrictive new rules on toxics, industrial waste, and air pollution.

- The polluting factories were either forced to make immediate improvement of the conditions or pay compensation to the victims.

- Some factories were even forced to shut down or move to another location.
- A few preventive actions have even succeeded in forcing prospective plants to withdraw from their planned construction

Ironically, however, these successful cases of citizen action created a new problem, which was the migration of polluting industries from Taiwan and Korea to China and Southeast Asia mainly for two reasons: cheap labor and soft environmental laws.

1.5.6 Environmental Struggles in Southeast Asia

Unlike in Korea and Taiwan, environmental movements already existed in a number of the Southeast Asian countries before the period of rapid industrialization, which in their case occurred in the mid-eighties to the mid-nineties. Hence, some common environmental struggles in the region include;

- Struggles against nuclear power, as in the Philippines;
- Struggles against big hydroelectric dams, as in Thailand, Indonesia, and the Philippines; These forced the World Bank to withdraw its planned support for giant hydroelectric projects in Philippines and Thailand, and
- Struggles against deforestation and marine pollution, as in Thailand and the Philippines.

1.5.7 Environmental Protests in China

China's rapid economic growth continued to develop in 2007, with the country's gross domestic product (GDP) hitting 11.4 percent annualized rate of growth. This booming economy, however, has come alongside an environmental crisis. Sixteen of the world's twenty most polluted cities are in China.

Therefore, environmental crisis in China is very serious. Further manipulations of the problem are for example,

- The ground water table of the North China plain is dropping by 1.5 meters (5 feet) per year. However, this region produces 40 percent of China's grain.

- ❖ Water pollution and water scarcity; soil pollution, soil degradation and desertification; global warming and the coming energy crisis—these are all byproducts of China's high-speed industrialization and massively expanded consumption.

1.6. Global Efforts towards Protecting the Environment

During the late 1960s and early 1970s nations began to work together to develop worldwide approaches for monitoring and restricting global pollution.

The first major international conference on environmental issues was held in Stockholm, Sweden, in 1972 and was sponsored by the United Nations.

This meeting, at which the United States took a leading role, was controversial because many developing countries were fearful that a focus on environmental protection was a means for the developed world to keep the undeveloped world in an economically subservient (docile/passive) position.

The most important outcome of the conference was the creation of the United Nations Environmental Program (UNEP).

In an attempt to allay (alleviate/relieve) fears of the developing world, it became the first UN agency to be headquartered in a developing country, with offices in Nairobi, Kenya.

In addition to attempting to achieve scientific consensus about major environmental issues, a major focus for UNEP has been the study of ways to encourage sustainable development increasing standards of living without destroying the environment.

The Stockholm conference resulted in two documents:

1. the Stockholm declaration on Human Environment and
2. the Acton Plan for Human Environment

1.6.1 International Treaties

Dozens of international agreements have been reached in recent decades in an effort to improve the world's environmental status.

I. In 1975 the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) went into effect to reduce commerce in animals and plants on the edge of extinction.

II. In 1982 the International Whaling Commission agreed to a moratorium (suspension/pause) on all commercial whaling.

III. In 1987 Montréal Protocol (in Canada) on Substances that Deplete the Ozone Layer was held. Perhaps it was the most important international agreement.
For the first time, an international pact set specific targets for reducing emissions of chemicals responsible for the destruction of Earth's ozone layer.

IV. In 1989 the Basel Convention was held on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal,
This treaty limits the movement of hazardous wastes between countries.

V. In 1992 the UN Conference on Environment and Development was held in Rio de Janeiro, Brazil.
- Popularly it is known as the Earth Summit.
- This meeting was the largest gathering of world leaders in history.
  - 172 governments participated, with 108 sending their heads of state or government. Some 2,400 representatives of non-governmental organizations (NGOs) attended, with 17,000 people at the parallel NGO Forum, who had so-called Consultative Status.

The Earth Summit resulted in the following five documents:

A. **Rio Declaration on Environment and Development**
B. **Agenda 21**
C. **Convention on Biological Diversity**
D. **Forest Principles**
E. **Framework Convention on Climate Change**

Both *Convention on Biological Diversity* and *Framework Convention on Climate Change* were set as legally binding agreements.

- ❖ USA was one of the very few countries that refused to sign both treaties- on biodiversity and climate change.

1.6.1.1 Rio Declaration

This was a short document produced at the 1992 United Nations Conference on Environment and Development (UNCED) held in Rio de Janeiro, Brazil from 3 to 14 June 1992. It has about 27 principles intended to guide future sustainable development around the world (UNEP, 2011).

A few of the core principles are as follows:

- State Sovereignty
- Right to development
- Sustainable development
- Right to life and a healthy environment
- Duty not to cause environmental harm
- Intergenerational equity
- Duty to assess environmental impacts

1.6.1.2 Agenda 21

This is a programme or plan of action run by the UN related to sustainable development. It is a comprehensive blueprint of action to be taken globally, nationally and locally. The number 21 refers to the 21st century.

1.6.1.3 The Convention on Biological Diversity

This convention has three main goals:

- ❖ conservation of biological diversity (or biodiversity);
- ❖ sustainable use of its components; and

- ❖ fair and equitable sharing of benefits arising from genetic resources, notably those destined for commercial use

The agreement covers all ecosystems, species, and genetic resources.

1.6.1.4 The Forest Principles

The forest principle is the informal name given to the "Non-Legally Binding Authoritative Statement of Principles for a Global Consensus on the Management, Conservation and Sustainable Development of All Types of Forests".

1.6.1.5 Framework Convention on Climate Change

The 1992 agreement on global warming limited each industrialized nation to emissions in the year 2000 that were equal to or below 1990 emissions.

1.6.1.6 Kyōto Protocol

In 1997, a follow-up conference called Kyōto Protocol was held in Japan. Representatives from 160 countries signed the Kyōto Protocol. It called for industrialized nations to reduce emissions to an average of about 5 percent below 1990 emission levels and to reach this goal between the years 2008 and 2012. USA has refused to ratify the accord.

- However, scientists expect that its (the Protocol's) emission requirements are too minimal to be effective. Some experts predict that a 60 percent reduction in emissions will be necessary to stabilize the world's climate.

1.6.1.7 World Summit on Sustainable Development

In 2002 delegates from nearly 200 countries convened at the World Summit on Sustainable Development in Johannesburg, South Africa, to establish new sustainable development goals for the 21st century.

- The 2002 summit created an action plan that called on nations to;
  - ✓ reduce by half the proportion of people who lack sanitation by 2015,

- ✓ minimize health and environmental problems caused by chemical pollution by 2020, and
- ✓ reduce significantly the number of endangered species by 2010

1.6.1.8 Green Parties

A desire for environmental change led to the creation of various political parties around the world whose emphasis was largely on environmental protection.

By far the most successful green party has been Bündnis 90/Die Grünen, the green party of Germany. In 1998 Bündnis 90/Die Grünen formed a coalition with the newly elected Social Democratic Party of German chancellor Gerhard Schröder, marking the first time that the green party had entered Germany's national government.

- ❖ Green parties have emerged in almost all countries that have open elections, but they have had the largest impact in those nations where proportional representation within a parliamentary system occurs.
    - o Thus, the green parties have not played a significant role in American politics.

1.7 Environmental Ethics

Environmental ethics is the discipline in philosophy that studies the moral relationship of human beings to, and also the value and *moral* status of, the environment and its nonhuman contents. This entry covers:

(1) The challenge of environmental *ethics* to the anthropocentrism (i.e., human-centeredness) embedded in traditional western ethical thinking;

(2) The early development of the discipline in the 1960s and 1970s;

(3) The connection of deep ecology, feminist environmental ethics, and social ecology to politics;

(4) The attempt to apply traditional ethical theories, including consequentialism, deontology, and virtue ethics, to support contemporary environmental concerns; and

(5) The focus of environmental literature on wilderness, and possible future developments of the discipline.

Ethics is a branch of philosophy that defines fundamentally what is right and what is wrong regardless of cultural differences.

Morals reflect the predominant feelings of a culture about ethical issues. One example on the difference between ethics and morals is that, in almost all cultures it is certainly unethical to kill someone, however when a country declares war most of its people accept the necessity of killing the enemy. Therefore, it is a moral thing to do even though ethics says that killing is wrong.

Environmental issues require a consideration of ethics and morals. There are many ethical decisions that human beings make with respect to the environment. For example:

- Should we continue to clear cut forests for the sake of human consumption?
- Should we continue to make gasoline powered vehicles, depleting fossil fuel resources while the technology exists to create zero-emission vehicles?
- What environmental obligations do we need to keep for future generations?
- Is it right for humans to knowingly cause the extinction of a species for the (perceived or real) convenience of humanity?

Furthermore, *environmental ethics* is a topic of applied ethics that examines the moral basis of environmental responsibility. In these environmentally conscious times, most people agree that we need to be environmentally responsible. The goal of environmental ethics, then, is not to convince us that we should be concerned about the environment-most of us already are. Instead, it focuses on the moral foundation of environmental responsibility and how far this responsibility extends.

There are three primary theories of moral responsibility to the environment.

First theory:

Anthropocentric or human centered: Environmental anthropocentrism is the view that all environmental responsibility is derived from human interests alone.

- It involves that duty to ensure that the earth remains environmentally hospitable for supporting human life and that its beauty and resources are preserved so that human life on earth continues to be pleasant.
- It assumes only human beings are morally significant organisms and have a direct moral standing.

Second theory:

Biocentric or biocentrism: biocentrism is a political or ethical stance which asserts the value of non-human life in nature. According to the broadest form of the life-centered theory, all forms of life have an inherent right to exist. There is variation in approach to this:

- Some think that we have greater responsibility to protect animal species than plant.
- Others determine the right of various species depending on the harm they do to humans. For example, they see nothing wrong in killing pest species such as rats or mosquitoes.
- Some go further and believe that each individual organism, not just each species, has a basic right to survive.

Third theory:

Ecocentrism: maintains that the environment deserves direct moral consideration and not one that is merely derived from human and animal interests.

- Ecocentrism is a philosophy that recognizes that the ecosphere is the source and support of all life and as such advises a holistic and eco-centric approach to government, industry, and individual.

- ❖ The root of "eco" is "home," and the ecosphere is the home-sphere.
- ❖ Ecocentrism puts the ecosphere first.
- ❖ Ecocentrism does not even distinguish between animate life and inanimate matter or process. The entire "sphere" of life is important.

Some of the new thoughts on environmental ethics are founded on awareness that humanity is part of nature and that nature's many parts are interdependent. In any natural community, the wellbeing the individual and of each species is tied to the wellbeing of the whole. In a world increasingly without environmental borders, nations, like individuals, should have a fundamental ethical responsibility to respect nature and to care for the earth, protecting its life-support systems, biodiversity and beauty and caring for the needs of other countries and future generations. Environmental ethicists argue that to consider environmental protection as a "right" of the planet is a natural extension of the concept of human rights.

Environmental Attitudes:

There are many attitudes or principles about the environment. Most of which fall under one of the three headings: development ethics, the preservation ethics, and the conservation ethics.

A. Development ethic/principle

Development ethic/principle is based on **individualism or egocentrism.** It assumes that the human race is and should be the **master** of nature and the earth and its resources exist for our benefit and pleasure.

- ❖ In development ethics, nature has only instrumental value; that is the environment has value only insofar as human beings economically utilize it.

B. Preservation ethic/principle:

Preservation ethic/principle considers that nature is special in itself. Nature has intrinsic value or inherent worth apart from human appropriation.

- Some have religious belief regarding nature. They have a reverence for life and respect the right of all creatures to live, no matter what the social and economic costs.

- Some preservationists' interest in nature is aesthetic and recreational. They believe that nature is beautiful and refreshing and should be available for picnics, hiking, camping, fishing, or just peace and quiet.

- There are also preservationists whose reasons are essentially scientific. They argue that the human species depends and has much to learn from nature. Rare and endangered species and ecosystems, as well as the more common ones, must be preserved because of their known and assumed long range practical utility. In this view natural diversity, variety, complexity and wilderness are thought to be superior to humanized uniformity, simplicity and domesticity.

C. **Conservation or management ethic/principle**:

Conservation or management ethic/principle recognizes the desirability of decent living standards. It works toward a balance of resource use and resource availability. It stresses a balance between total development and absolute preservation. The goal of preservation ethic is one people living in one world, indefinitely.

CHAPTER TWO: DEVELOPMENT

2.1 The Concept of Development

Development is the process of improving the entire living conditions of all people of a nation. Development is both a physical realty and state of mind in which societies have secured for obtaining better life. This concept is broader than the concept of economic growth.

Economic development is the process by which simple, low income national economies are transformed into modern industrial economies. It involves a rise in real income per person. This phrase is applied to discussion that increasing of wealth is a key in bringing change in 'underdeveloped economies' or in countries with low levels of economic development. Therefore, economic development comprises both the emergence of sustained and rapid extensive growth, and the emergence of sustained and rapid intensive growth.

Meanwhile, economic growth is generally applied to express the economic improvement of developed countries. It refers to the increase in the total wealth of a nation regardless of population. It is used to refer increasing output in production.

According to (Todaro & Smith, 2009) development can be;

> *... a multidimensional process involving changes in structures, institutions, and attitudes as well as the acceleration of economic growth, the reduction of inequality, and the eradication of absolute poverty. Development must represent the entire range of changes by which an entire social system, tuned to the diverse basic needs and desires of individuals and social groups within that system, moves away from a condition of life widely perceived as unsatisfactory, and moves towards a situation or condition of life regarded as materially and spiritually 'better'.*

It is said that development is multi-dimensional process concerning all the changes of the social system for a better way or condition. Economic development, generally speaking, is a process of change that is focused on the betterment of the community, state, and/or nation.

Defining economic development can be difficult. The first term in this phrase—*economic*—refers to an accepted paradigm for organizing the business and financial and even to some extent the governmental sectors of a nation. Economics is viewed as the foundation for building a prosperous society. However, it is the second term—*development*—over which there is considerable debate. People's perceptions of development vary. For some, development has the appearance of successful commercial enterprise; for others, the face of development is one of economic equality. Nevertheless, the concept of economic development has the attention of government, the business sector, and the citizenry. Economic development is pursued as one of the goals of a successful country, state, or city. It captures the attention of the news media and impacts, as well as is impacted by, political objectives.

Therefore, there several interpretations of development, some of these are indicated on the following table.

Alternative Interpretation of Development	
Good	**Bad**
✓ Development brings economic growth ✓ Development brings overall national progress ✓ Development brings modernization along western line ✓ Development improves the provision of basic needs ✓ Development can help to create sustainable growth ✓ Development brings improved governance	• Development is a dependent and subordinate process • Development is a process creating and widening spatial inequalities • Development undermines local cultures & values • Development perpetuates poverty and poor working and living conditions • Development is often environmentally non sustainable • Development infringes human rights and undermines democracy

2.2 Core Values of Development

Development may be defined as a sustained advancement of an entire society and social system towards a "better" or "more human" life. However, the question of what constitutes good life is as old as philosophy and human kind. The appropriate answer for developing countries in the first decade of the 20th century is not necessarily the same as it would have been in previous decades.

But we agree with (Goulet, 1971) that at least three basic components or core values should serve as conceptual bases and practical guidelines for understanding the inner meaning of development. These core values, namely **sustenance**, **self-esteem** and **freedom** represent common goals sought by all individuals and societies. They relate to fundamental human rights.

2.2.1 Sustenance: - The Ability to Meet Basic Needs

All people have certain basic needs without which life would be impossible. These life sustaining basic human needs include **food**, **shelter**, **health**, and **protection**. When any one of these is absent, or in critically short supply, a condition of "absolute underdevelopment" exists. The basic function of economic activities is to meet these basic needs.

Thus, it can be claimed that economic development is a necessary condition for the improvement in the quality of life. Human beings are born with certain potential capacities. Without these basic needs, the utilization of human potential would not be possible.

2.2.2 Self-esteem to be a person

Self-esteem is a sense of worth and self-respect, not being used as a tool by others for its own ends. All people and societies seek some basic form of self-esteem. Though they may call it authenticity, identity, dignity, respect, honor or recognition the nature and form of self-esteem may vary from society to society and from culture to culture.

Of course, it is closely associated with material prosperity. Consequently, it is often difficult for those who are materially deprived to experience sense of pride or self-esteem.

2.2.3 Freedom from servitude: - To be able to choose

Freedom (liberty), right of individuals to act as they choose. In this sense, it is frequently called individual liberty.

Freedom is understood in the sense of emancipation from alienating material conditions of life and from social servitude to nature, ignorance, other people, misery, institutions, and dogmatic beliefs, especially one's poverty is one's destination. Freedom involves expanded range of choices for societies.

According to (Lewis, 2003), "the advantage of economic growth is not that wealth increases happiness, but that it increases the range of human choice." Wealth can enable people to gain greater control over nature and the physical environment than they would have if they remained poor.

The concept of human freedom should also encompass various components of political freedom including but not limited to freedom of expression, personal security, political participation, and equality of opportunity.

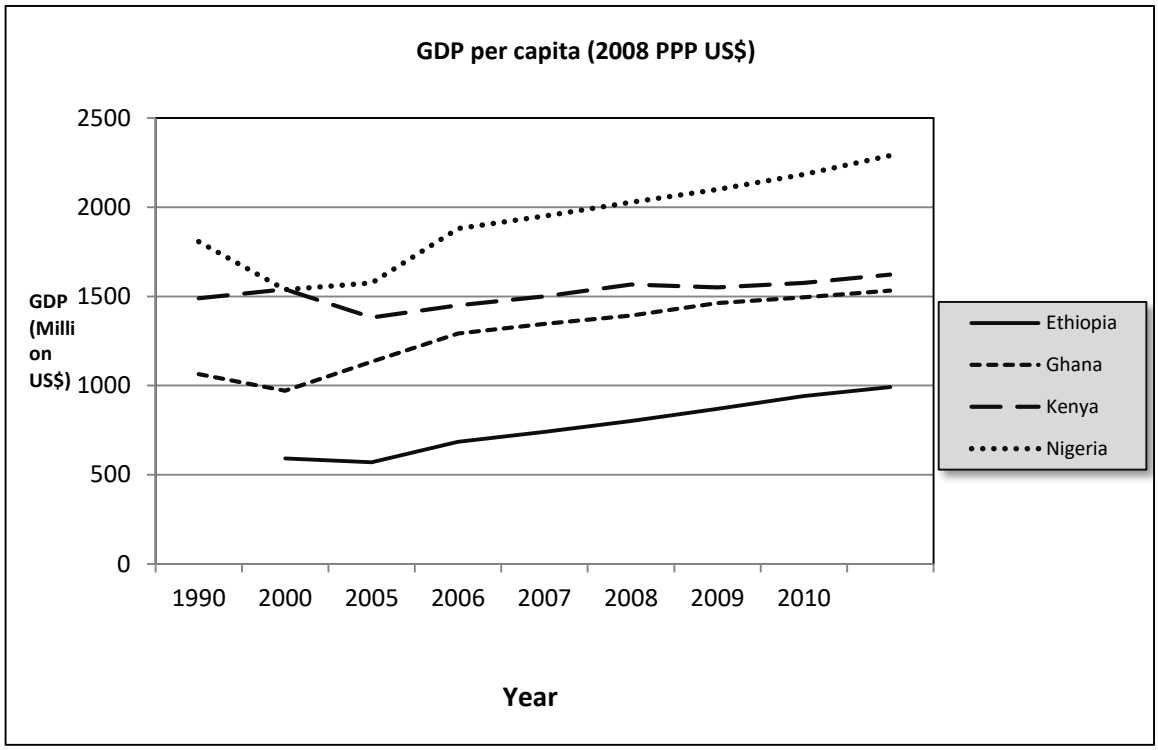
2.3 Indicators of development

2.3.1 Economic Wealth

Wealth is the net worth of a person, household, or nation, that is, the value of all assets owned and net of all liabilities owed at a point in time. It is usually measured by economic indicators such as gross domestic product (GDP) and Gross National Product (GNP). These are measures of economic performance in a country.

GDP- is the money value of the total final outputs of goods and services produced in a single year within a country's boundaries. It is one of the primary indicators used to gauge the health of a country's economy. It represents the total money value (e.g. US dollar) of all goods and services produced over a specific time period - you can think of it as the size of the economy. Look at the figure below for comparison of the economies of four African countries. Usually, GDP is expressed as a comparison to the previous quarter or year. For example, if the year-to-

year GDP is up 3%, this is thought to mean that the economy has grown by 3% over the last year.



Source: (UNDP, 2010)

Measuring GDP is complicated but at its most basic, the calculation can be done in one of two ways: either by adding up what everyone earned in a year (income approach), or by adding up what everyone spent (expenditure method). Logically, both measures should arrive at roughly the same total.

The income approach which is sometimes referred to as GDP (I), is calculated by adding up total compensation to employees gross profits for incorporated and non-incorporated firms, and taxes less any subsidies. The ***expenditure*** method is the more common approach and is calculated by adding total consumption, investment, government spending and net exports.

As one can imagine, economic production and growth, what GDP represents, has a large impact on nearly everyone within that economy. For example, when the economy is healthy, you will typically see low unemployment and wage increases as businesses demand labor to meet the growing economy.

These are the most common approaches to assess the level of development. To compare levels of economic development, we should use **single currency** such as the USD and Euro.

GDP or GNP is also easier to measure and obtain. But it is less accurate in countries of **non-market economies**, where:

- the economy is centrally planned, i.e., non-market oriented
- market is less developed,
- trading is usually done at home through bartering, and
- much production is done at home for subsistence

Moreover, higher per capita income in a country does not necessarily mean that its people are better off than those in a country with lower per capita income. This is because there are many aspects of human wellbeing that these indicators do not capture.

As a result, GDP/GNP per capita has the following shortcomings:

- They do not show how equitably the country's income is distributed.
- They do not account for pollution, environmental degradation and resource depletion.
- They don't register unpaid work done within the family or community or work done with in the shadow (underground or informal).
- They attach equal importance to 'goods" such as medicine and "bads" like cigarettes and chemical weapons whereas ignoring the value of leisure and human freedom.

Therefore, due to these and other weaknesses of GDP/GNP measures another more inclusive criteria of social, cultural and welfare came into use.

2.3.2 Social, cultural and welfare criteria

The **Physical Quality of Life Index** (PQLI) is an attempt to measure the quality of life or well-being of a country. The value is the average of three statistics: ***infant mortality***, ***basic literacy rate***, and ***life expectancy*** at age one. It was developed by the Overseas Development Council (ODC), which is an international policy research institution based in Washington, DC in the mid-1970s as one of a number of measures created due to dissatisfaction with the use of GNP as an indicator of development.

Life expectancy at age 1, infant mortality, and literacy are used as indicators of development, describing progress in health, sanitation, education, and women's status. Gross National Product (GNP) is the standard measure of progress but does not show how output is distributed. The Physical Quality of Life Index (PQLI) is a summation of complex social interrelationships on which no theoretical explanation imposes any given weights/biases. Equal weight is assigned to each component and it is measured between 0 and 100. Thus, the highest infant mortality is assigned a value of 0, the lowest infant mortality is assigned a value of 1, and the rest are set in between, and the un weighted values of the three factors are added together to determine a country's PQLI.

The life expectancy for example in Nigeria is 49 years, infant mortality is 180/1000, and literacy rate is 25%. The country's PQLI is therefore, 25. Meanwhile, the life expectancy at age 1 in the U.S. is 72, infant mortality 16/1000, and literacy 99%, and the PQLI is 94.

The PQLI informs about the changing distribution of social benefits among countries, between the sexes, among ethnic groups, and by region and sector. The PQLI facilitates international and regional comparisons by minimizing developmental and cultural ethnocentricities. As the gap closes between current performance and maximum attainable performance, the gaps between PQLI indices should close. The PQLI, with signs of lowered infant mortality and lengthened life expectancy, paints a less fatalistic pessimistic picture than the GNP.

PQLI might be regarded as an improvement but shares the general problems of measuring **quality of life** in a quantitative way. It has also been criticized because there is considerable overlap between infant mortality and life expectancy.

2.3.3 The UN Development Program's Human Development Index (HDI)

In 1990, the United Nations Development Program (UNDP) published the first Human Development Report (HDR, 2011) in which development was measured in a new way i.e., using Human Development Index (HDI). The Report introduced a new way of measuring development by combining indicators of life expectancy, educational attainment and income into a composite human development index, the HDI. The breakthrough for the HDI was the creation of a single statistic which was to serve as a frame of reference for both social and economic development. The HDI sets a minimum and a maximum for each dimension, called

goalposts, and then shows where each country stands in relation to these goalposts, expressed as a value between 0 and 1.

HDI is a summary measure of three dimensions of human development: *leading a long and healthy life, being knowledgeable, and having a decent standard of living.*

Hence, it measures the average achievements in a country in three basic dimensions of human development:

- A long and healthy life, as measured by life expectancy at birth;
- Knowledge, as measured by adult literacy rate (with two-thirds weight) and combined primary, secondary and tertiary gross enrollment ratio (with one-third weight); and
- A decent standard of living, as measured by GDP (PPP US$) per capita. ***Purchasing power parity*** *(PPP) refers to the number of units of a foreign country's currency required to purchase the identical quantities of goods and services in the local (LDCs) market as $1 would buy in the US.* In other words it refers to the idea that in absence of transaction costs and official barriers to trade, identical goods will have the same price in different markets when the prices are expressed in terms of one currency

The HDI sets a minimum and a maximum for each dimension, called goalposts.

Goalposts for calculating HDI

Goalposts for the Human Development Index in 2010

Indicator/Dimension	Observed Maximum value	Minimum value
Life expectancy at birth (years)	83.2 (Japan,2010)	20
Mean years of schooling	13.2 (USA,2000)	0
Expected years of schooling	20.6 (Australia,2002)	0
Combined education index	0.951 (New Zealand)	0
Per capita income (PPP US$)	108211 (UAE)	163 (Zimbabwe, 2008)

Performance in each dimension is expressed as a value between 0 and 1 by applying the following general formula:

$$\textbf{Dimension index} = \frac{Actual\,value - Minimum\,value}{Maximum\,value - Minimum\,value}$$

Then, aggregating the sub-indices produces the Human Development Index. The HDI is therefore, obtained by the geometric mean of the three dimension indices using the following method:

HDI = ($I_{Life}^{1/3} \times I_{Education}^{1/3} \times I\ Income^{1/3}$) or in other way

HDI = 1/3(life expectancy index) + 1/3(education index) + 1/3(GDP index)

Let us do some example.

Suppose in 2010, China has the following goalpost values shown on the table below;

Indicator	Value
Life expectancy at birth (years)	73.5
Expected years of schooling (years)	11.4
Mean years of schooling (years)	7.5
GNI per capita (PPP US$)	7,263

Then, calculate the country's HDI

1. Life expectancy index = $\frac{73.5-20}{83.2-20} = 0.847$

2. Mean years of schooling index = $\frac{7.5-0}{13.2-0} = 0.568$

3. Expected years of schooling = $\frac{11.4-0}{20.6-0} = 0.553$

Thus, education index is;

4. Education index = $\frac{\sqrt{0.568 \text{ x } 0.553}-0}{0.951-0} = 0.589$

5. GDP income index = $\frac{\ln(7263) - \ln(163)}{\ln(108211) - \ln(163)} = 0.584$

Therefore, Human development index for China in 2010 is

6. HDI = $\sqrt[3]{0.847\ x\ 0.589\ x\ 0.584} = 0.663$

- The HDI uses the logarithm of income, to reflect the diminishing importance of income with increasing GDP.
- The HDI is then calculated as a simple average of the dimension indices.

On the basis of HDI countries of the world are categorized as follows

- ✓ **0.0-----0.499 Low Human development**
- ✓ **0.5-----0.799 Medium Human development**
- ✓ **0.8------1.00 High Human Development**

Table 2. Human Development Index and its components (2010)

HDI Rank	Human Development Index (HDI) value 2010	Life expectancy at birth (years) 2010	Mean years of schooling (years) 2010	Expected years of schooling (years) 2010	Gross national income (GNI) per capita (PPP2008S) 2010
1 Norway	0.938	81.0	12.6	17.3	58.810
2 Australia	0.937	81.9	12.0	20.5	38,692
4 United States	0.902	79.6	12.4	15.7	47,094
128 Kenya	0.470	55.6	7.0	9.6	1,628
157 Ethiopia	0.328	56.1	1.5	8.3	992
169 Zimbabwe	0.140	47.0	7.2	9.2	176

Source: (HDR, 2011)

How is the HDI used?

HDI can be used in the following ways

1. To capture the attention of policy makers, media and NGOs and to draw their attention away from the more usual economic statistics to focus instead on human outcomes.

    - The HDI was created to re-emphasize that people and their capabilities should be the ultimate criteria for assessing the development of a country, not economic growth.

2. To question national policy choices - asking how two countries with the same level of income per person can end up with such different human development outcomes (HDI levels).

For example, **Equatorial Guinea** and **Czech Republic** have similar levels of income per person (22,218 USD and 22,678 USD respectively), but life expectancy and literacy differ greatly between the two countries, with Czech Republic having a much higher HDI value (0.841 and rank of 28^{th} in the world) than Equatorial Guinea whose HDI value is 0.538 and its rank is 117^{th} in the world.

- These striking contrasts between the two countries immediately stimulate debate on government policies on health and education.

3. To highlight wide differences within countries, between provinces or states, across gender, ethnicity, and other socioeconomic groupings. Highlighting internal disparities along these lines has raised national debate in many countries.

Weaknesses of HDI

HDI has the following shortcomings;

- It does not reflect political participation or gender inequalities.

- It does not measure human rights or freedom. That is why UNDP did produce separate Human Freedom index (HFI) in 1991 though freedom is difficult to measure and is too volatile, given military coups and presence of dictators.
- It does not allow us to judge the relative importance of its different components.

2.3.4 Other Criteria for Measuring Development

There are also other criteria in measuring development in which each can be categorized either into social, economic and/ or environmental dimension. Several are linked to population, as shown on the following table:

✓ Birth rate,	✓ Percentage of rural population
✓ Crude death rate	✓ Telephone network
✓ Percentage of young population,	✓ Circulation of newspapers
✓ Numbers of doctors and hospitals per population	✓ Energy consumed per year
✓ Infant mortality rate	✓ Access to safe water
✓ life expectancy	✓ Import and export items
✓ Maternal mortality rate	✓ Number of cars

2.4 Development Theories

Development theory is a collection of theories about how desirable change in society is best to be achieved. Such theories draw on a variety of social scientific disciplines and approaches.

Let us first distinguish the difference between theory and model. A **theory** is a simplified and coherent explanation of the relationships of two or more facts whereas a **model** is a simplified representation of reality. Theory is used to understand the diverse and complex phenomena of

reality. It is an operational tool with the help of which one can understand reality, not the whole but useful and comprehensive segment of it.

Example, one might theorize that the demand of coffee depends directly on the price of tea and inversely on the price of coffee itself. A model illustrating this theory might show that an increase in the price of coffee by $1 would reduce the world wide sale by 500 tons.

Theories of development have existed for many years. The **earliest** of them can be traced back to the **classical economists**. But discussion of the term development in the social sciences is fairly recently. It was not required before the collapse of colonial system or before the onset of cold war. Since the late 1940s, however, the **problem of how to push** the pace of development in roughly one-hundred ex-colonial countries has generated intense interest among planners and in the academic world.

2.4.1 Classification of development theories

2.4.2 Taxonomic Principle for Development Theories

- **Delineation of taxonomic scope:** helps to minimize ambiguity regarding what should and should not be included in the classification scheme.
- **Adequacy of taxonomic categories:** there should be enough number of taxonomic categories to cover all theoretical constructs. Without adequate number of categories, ***some theories may be left out*** from the overall categories because they might not fit in any of the selected taxonomic categories. The number of categories should not also be **too many** that the ***purpose of classification itself is lost***.
- **Logic of taxonomic hierarchy:** appropriate hierarchy of classification is important. Development theories may be divided into categories; categories into sub-categories; sub-categories into sub-sub-categories, etc. But some sequential logic should be followed: from general to specific, from top down or the vice versa.
- **Exclusiveness between taxonomic categories:** the selected taxonomic categories must be mutually exclusive. They should not overlap. On other words, each theory should belong only to one category.

No single and comprehensive system of classifying development theories that can fulfill the above principles (Potter & et al, 2004).

- Some authors classify them as modernization (backwardness theories) and dependence theories, based on basic conception of the causes of underdevelopment.
- Some others organize the theories along the **scientific disciplines** as economic theories, sociological theories, demographic theories, climate theories, etc.
- Others differentiate between socialistic and market-economy oriented theories.
- Sill some others as radical and conservative theories

2.4.3 Modernization theories:

- Were about the processes by which primitive societies (i.e., nonwestern) would become "modern" ones (i.e., westernized).
- Were the products of three main historical events in the post WWII:
    - The rise of USA as a super power to contain the growth of the international communist movement. For this US financed the industrialization of Western Europe, South Korea and Taiwan as well as the reconstruction of Japan through Marshall Plan.
    - The growth of worldwide communist movement.
    - The process of decolonization
- Assume social change is slow, gradual and unidirectional; the fate of human evolution is predetermined.
    - The underlying assumption is that modernization influences are projected to peripheral regions from Western Europe and North America. Hence, the path to progress from traditional to modern is unidirectional.
- Assume internal factors in the country such as illiteracy, traditional agrarian structure, traditional attitude of the people, low division of labor, lack of communication and infrastructure, etc, are responsible for underdevelopment.
    - Consequently the change of endogenous factors is the strategy of development

- Industrial countries are the model of economy and society, and this model will be reached sooner or later.
- There is a continuum between the most and the least developed countries, and each country has its position on the line. The difference as compared to the industrialized countries is the degree of backwardness which has to be made up for.
- Suitable measures are the modernization of the production apparatus, capital aid, transfer of know-how, so that the developing countries can reach the stage of industrialized countries as soon as possible.

Example of modernization theories:

2.4.3.1 Theory of Development Poles (RERROUX 22)

The promotion of regional development centers will serve as focal point and incentive for further development. Such a regional concentration helps to reap the benefits of technological external economies and makes the growth center attractive to entrepreneurs, thus initiating further development. This theory uses temporary regional imbalances to initiate development.

2.4.3.2 The trickledown theory

The initial benefits of growth go the rich, but eventually trickle down to the poor. For example, rich families by local produce and employ servants, etc.

2.4.3.3 Other modernization theories which are to be discussed later are

i. The linear stages of growth model

ii. Theories and patterns of structural change

iii. The neoclassical/neoliberal counterrevolution

2.4.4 Dependence Theories

According to dependence theories, the cause of underdevelopment is the dependence on industrialized countries while internal factors of developing countries are considered irrelevant or seen as symptoms and consequences of dependence.

Developing countries are dependent countries. The economic and political interests of industrialized countries determine their development or under development. The goals are superimposed.

As to the causes of dependence, the various theories differ, economic factors always dominating.

- External trade theories concentrate on economic relations between countries.

- Imperialism theories stress the politico economic interest.
    - According to V.I. Lenin's theory Imperialism represents the geographical extension of capitalism from its historical center to the rest of the world.
- The Development of underdevelopment theory owes much to the work of André Gunder Frank (1969). He drew on the Latin American experience to argue that development of the West depended up on the impoverishment of the periphery.
    - It pays special attention to a complement of the theory of imperialism, the theory of dependence that relates the effect of imperialism on underdeveloped countries.
- Dependence theories concentrate on the deformation of internal structures by dependence which perpetuates the situation.

Dependence theories concentrate on explanations of the genesis of underdevelopment and pay little attention to strategies for overcoming this situation. Implicit development here means liberation, end of structural dependence, and independence.

Development, as already discussed earlier, is a multidimensional process. It has also been viewed or understood differently at different time. Even in the same period, scholars may disagree on policies and strategies to be followed towards achieving a certain development goal may due difference in their background, experience, and perception. Consequently, since the end of WWII, we have witnessed four strands of development thoughts.

These are four types of dependency theories:

i. The linear stages of growth model
ii. Theories and patterns of structural change
iii. The international dependence revolution
iv. The neoclassical/neoliberal counterrevolution

2.4.5 The linear stage of theories

There is a long history of ideas about the "stages" of growth in various Enlightenment theories of human progress. Thus, theories of the 1950s and 1960s, viewed the process of development as a successive stages of economic growth through which all countries must pass.

2.4.5.1 Rostow's Stages of Growth

Rostow's stage of growth is one of the prominent theories of linear stages of growth. According to this theory, all countries must pass through five stages. These stages are explained below.

1. **Traditional societies** had limited "production functions" (that is, combinations of factors of production); primitive technologies; and spiritual attitudes toward the physical world. These placed a ceiling on productivity and limited economies to the agricultural level. A hierarchical social structure, in which political power was held by landowners, gave little scope for social

mobility. The value system was derived from long-run fatalism. But he justified this historical conflation as necessary for clearing the way to get at his main subject, the post traditional societies, where each of the major characteristics of the traditional society was altered to permit regular growth.

Traditional societies are characterized by:

- subsistence economy
- very limited technology and capital
- ideologically antipathy or at least unconcern for modernization

2. Preconditions for take-off constituted the second universal historical stage. These preconditions cohered in Western Europe during the late 17^{th} and early 18^{th} centuries as the insights of modern science were translated into new production functions in agriculture and industry (for example, more machinery, in contrast to brute labor) in a setting made highly dynamic by international expansion. Favored by geography (its location just off the west European coast), better trading possibilities, and a conducive political structure, Britain was the first country to develop these preconditions.

The precondition for takeoff (transitional period) has the following basic characteristics

- needs external injection of help to move to this stage
- seeking modern life
- mechanization & commercialization of agriculture
- extractive industries develop
- single industry commonly dominate
- growth is slow
- investment is about 5%

3. **Take-off** was the "great watershed in the life of modern societies," when blockages and resistance to steady growth were finally overcome. In Britain and the "well-endowed parts of the world populated substantially from Britain" (the United States, Australia, New Zealand) the proximate stimulus for take-off was mainly technological (railroads, factories, etc.), but elsewhere a political context favorable to modernization was also necessary. During take-off the rate of effective investment rose from 5% of national income to 10% or more, new industries expanded, profits were ploughed back, urban industrial employment increased, and the class of entrepreneurs expanded. New techniques spread usually from industry to agriculture and, in a decade or two; the social and political structures of society were transformed so that steady economic growth could be sustained.

Take off has the following basic characteristics

- manufacturing industries grow rapidly
- breakdown of resistance of modernization
- growth becomes common place, expected and institutionalized
- political and social adjustments are necessary to adapt new way of life
- growth is limited to one or two parts (growth pole)
- numbers in agriculture declines
- investment increases from 5% to 10% or more of GDP

4. The drive toward maturity occurred over a protracted period of time as modern technology spread over the whole spectrum of a country's economic activity, 10–20% of the national income came to be reinvested in the economy, and growth outstripped any increase in population (that is, productivity per capita increased). About 60 years after take-off a society attained "maturity"—that is, a state in which there were sufficient entrepreneurial and technical

skills to produce anything the society needed, whether it be machine tools, chemicals, or electrical equipment.

Drive to maturity has the following basic characteristics:

- widespread technology application
- diversified industrial production
- growth spreads to all parts of the country
- rapid urbanization
- some benefits may be directed to social welfare, investment in abroad, or large defense expenditure
- some early industries decline

5. High mass consumption was the final stage where the leading industrial sectors became durable consumer goods and services (for example, automobiles), real income rose to a level permitting a large number of people to consume at levels far in excess of needs, and the structure of the work force changed toward the urban-skilled and office types of employment. Western societies at this level might choose to allocate increased resources to social welfare and social security. This fifth stage was reached by the United States during the 1920s and more fully during the immediate postwar decade; Western Europe and Japan entered this stage during the 1950s.

High mass consumption is characterized by:

- rapid expansion of tertiary industries and welfare facilities
- employment grows in service industries while declines in manufacturing
- industries shift to production of durable consumer goods
- new technological improvements turn to an emphasis on consumption, i.e. prepared food, packaging, and preserving, styling and luxury items

- overriding concerns are educational investment, welfare, security and leisure time expenditures
- is best exemplified by USA

The only things needed for countries to pass through these stages are:

- ✓ entrepreneurialism
- ✓ saving
- ✓ technological progress
- ✓ correct political system

Critiques of Rostow's stage of growth

- Countries may leap frog some stages.
- The international dimension is left out.
- Development is not universal and is not simple as the model.
- Suggestion of the need for capital to advance a country from traditional country is refuted by large injection of aid to many LDCs.

2.4.5.2 Harrod-Domar Model

The model is based on a simple economic logic, that is, if we increase saving, investment will increase and as the same time output will also increase. For the economy to grow, saving rate should be 15-20% of the GDP.

The Harrod-Domar growth model gives some insights into the dynamics of growth. We want a method of determining an equilibrium growth rate **g** for the economy. Let **Y** be GDP and **S** be **savings**. The level of savings is a function of the level of GDP, say **S = sY**. The level of capital **K** needed to produce an output **Y** is given by the equation **K = σY** where **σ** is called the capital-output ratio.

Investment is a very important variable for the economy because Investment has a dual role. Investment **I** represents an important component of the demand for the output of an economy as well as the increase in capital stock. Thus **ΔK = σΔY**. For equilibrium there must be a balance between **supply** and **demand** for a nation's output. In simple case this equilibrium condition reduces to **I = S**. Thus,

$$\mathbf{I = \Delta K = \sigma \Delta Y}$$
$$\mathbf{and\ I = S}$$
$$\mathbf{so}$$
$$\mathbf{\sigma \Delta Y = sY.}$$

Therefore the equilibrium rate of growth g is given by

$$\mathbf{g = \Delta Y/Y = s/\sigma}$$

In words, the equilibrium growth rate of output is equal to the ratio of the marginal propensity to save and the capital-output ratio. This is a very significant result. It tells us how the economy can grow such that the growth in the capacity of the economy to produce is matched by the demand for the economy's output.

Consider this numerical illustration. Suppose the economy is currently operating at a capacity production level of **1000** per year and has a capital-output ratio of **3**. This means the capital stock is 3000. Assume the marginal propensity to consume out of GDP is **0.7** so the marginal propensity to save is 0.3. This includes business and public saving as well as household saving. The Harrod-Domar growth model tells that the equilibrium growth rate is **g = 0.3/3 = 0.1**; i.e., the economy can grow at 10 percent per year. We can now check this result. At the current GDP of 1000 the level of saving is **0.3*1000=300**. The growth in GDP is **0.1*1000 = 100** and with a capital-output ratio of 3 the additional capital required to produce the additional output is **3*100=300**. This is the investment required in order to increase capacity by the right amount and, sure enough, this happens to be equal to the amount of saving available in the economy.

The saving gap should somehow be filled by transfer of resources from:

- ❖ Foreign aid,
- ❖ Technical assistance, and
- ❖ Private foreign investment.

This is reinforced by the experience of war torn Europe after WWII where the US provided finance and technical assistance through the Marshall Plan.

Criticisms

- In the case of developing countries, it did not work well. Because they were/are receiving capital and technical assistance but bring almost no change.
    - Thus, resource flow is a necessary condition but not a sufficient condition.
- The LDCs are entangled with an international economic system, which frustrate their development efforts.
    - The MDCs put conditionalities when they give aid.

2.4.6 Theories and patterns of structural change

In 1970s, the linear stages of growth were replaced by two competing schools of thought: theories and patterns of structural change and the international dependence revolution.

Theories and patterns of structural change deal, as the name indicate, about the structural change of poor economies from traditional subsistence agriculture to modern, urban, industrial and service sector economy.

2.4.6.1 Arthur Lewis Model: -

One of the best-known early theoretical models of development that focused on the structural transformation of a primarily subsistence economy was that formulated by Arthur Lewis in the mid-1950s and later modified, formalized, and extended by John Fei and Gustav Ranis. The Lewis two-sector model became the general theory of the development process in surplus-labor Third World nations during most of the 1960s and early 1970s.

Therefore, it focused on structural change of the economy and comprises two sectors. These are:

- Traditional agricultural sector and
- Modern urban based industrial sector.

The model explains how labor transfers in a dual economy. For Lewis growth of the industrial sector drives economic growth.

The Lewis model argues that economic growth requires structural change in the economy where by surplus labor in traditional agricultural sector with low or zero marginal product, migrate to the modern industrial sector where high rising marginal product. Transferring surplus labor from rural areas to urban has no effect on agricultural productivity. In the meantime firms/companies' profits are reinvested. ***Growth means jobs for surplus rural labor***. Additional workers in the urban areas increase output and hence incomes and profits.

The ability of the modern sector to absorb surplus workers depends on the **speed of investment** and **accumulation of capital**. It assumes that the wage remain constant until supply of rural surplus is exhausted.

Criticisms

- Neglect of agriculture-yet most people live in the rural areas.
- Increased saving may be reinvested in labour saving capital rather than taking a newly arrived workers.
- For many less developed countries, rural urban migration levels have been far greater than the formal industrial sectors ability to provide jobs.
  - Urban poverty replaced rural poverty.
- Most contemporary researches indicate that there is little general surplus labour in rural location ***except some seasonal*** and ***geographical specialties***.
- **Labour unions** fight for salary increment. There is government civil service wage rate which may change every year.

2.4.7 The International Dependence Revolution

These models gained increasing support by intellectuals of less developed countries in 1970s, as a result of growing disenchantment with both the stages and structural-change models. While this theory to a large degree went out of favor during the 1980s and into the 1990s, versions of it have enjoyed a resurgence in the early years of the twenty-first century, as some of its views have been adopted, albeit in modified form, by theorists and leaders of the anti-globalization movement. Essentially, international-dependence models view developing countries as beset by institutional, political, and economic rigidities, both domestic and international, and caught up in a dependence and dominance relationship with rich countries. Within this general approach are three major streams of thought: the **neocolonial dependence model**, the **false-paradigm model**, and the **dualistic-development thesis**.

2.4.7.1 The neocolonial dependence model

The first major stream, which we call the neocolonial dependence model, is an indirect outgrowth of Marxist thinking. It attributes the existence and continuance of underdevelopment primarily to the historical evolution of a highly unequal international capitalist system of rich country–poor country relationships. Whether because rich nations are intentionally exploitative or unintentionally neglectful, the coexistence of rich and poor nations in an international system dominated by such unequal power relationships between the center (the developed countries) and the periphery (the LDCs) renders attempts by poor nations to be self-reliant and independent difficult and sometimes even impossible.

This view was common in 1960s and 1970s. Supporters encourage ***revolution*** and ***suggest***

- South-south trade
- Removal of ***domestic oppressors*** and ***restructure*** the international economic order.

The view was also supported by ***patriots***, ***nationals***, and ***pro-poor activists***, etc.

2.4.7.2 The false paradigm model

A second and a less radical international-dependence approach to development, is the false-paradigm model, attributes underdevelopment to faulty and inappropriate advice provided by well-meaning but often uninformed, biased, and ethnocentric international "expert" advisers from developed-country assistance agencies and multinational donor organizations. These experts offer sophisticated concepts, elegant theoretical structures, and complex econometric models of development that often leads to inappropriate or incorrect policies. Because of institutional factors such as the central and remarkably resilient role of traditional social structures (tribe, caste, class, etc.), the highly unequal ownership of land and other property rights, the disproportionate control by local elites over domestic and international financial assets, and the very unequal access to credit, these policies, based as they often are on mainstream, Lewis-type surplus labor in many cases merely serve the vested interests of existing power groups, both domestic and international.

2.4.7.3 The Dualistic Development Thesis.

Dualism represents the ***existence and persistence*** of increasing divergence between rich and poor nations and rich and poor people at various levels. There is also dichotomy between rural and urban as well as gender.

- The coexistence is ***chronic***, not transitional
- The coexistence is ***not temporal***.
- The gap tends to be widening let alone benefits "trickle down" it develops underdevelopment.

Criticisms on the International Dependence Revolution

Strength:

- It offers explanation as to why poor countries remain poor.

Weakness:

- It has no explanation as to how poor countries can achieve self-sustained development.

- ❖ The economic performance of socialist countries which perused revolution showed almost no improvement. ***For instance,***
    - China and India started development after they opened up their economies.
    - South Korea, Taiwan and Singapore achieved development through export promotion.

2.4.8 The Neoclassical Counter Revolution: Market Fundamentalism

- ❖ Prevailed through much of the 1980s and early 1990s.
- ❖ Emphasized the beneficial roles of free markets, open economies, and privatization of inefficient public enterprises.
- ❖ Failure to develop is not due to exploitative external and internal forces as expounded by the dependence theorists; rather it is primarily the result of ***too much government intervention and regulation*** of the economy.
    - Thus, underdevelopment is internally induced.
- ❖ They support their arguments with the ***success stories*** of South Korea, Singapore, and Taiwan, etc. However, close assessment of the economies of these countries indicate that they ***don't fit the free market model***. Rather they were successful because they clearly defined:
    - What government should do, and
    - What private sectors should do

2.5 Structural Adjustment

Structural Adjustment Policies are economic policies which countries must follow in order to qualify for new World Bank and International Monetary Fund (IMF) loans and help them make debt repayments on the older debts owed to commercial banks, governments and the World Bank.

Although structural adjustment programs (SAPs) are designed for individual countries but have common guiding principles and features which include ***export-led growth***; ***privatization*** and ***liberalization***; and the ***efficiency of the free market***.

SAPs generally require countries to ***devalue their currencies*** against the dollar; ***lift import and export restrictions***; balance their budgets and ***not overspend***; and ***remove price controls*** *and* ***state subsidies***.

Devaluation makes their goods ***cheaper for foreigners*** to buy and theoretically makes foreign ***imports more expensive***. In principle it should make the country wary of buying expensive foreign equipment. In practice, however, the IMF actually disrupts this by rewarding the country with a large foreign currency loan that encourages it to purchase imports.

Balancing national budgets can be done by raising taxes, which the IMF frowns upon, or by cutting government spending, which it definitely recommends. As a result, SAPs often result in ***deep cuts in programs*** like education, health and social care, and the ***removal of subsidies*** designed to control the price of basics such as food and milk. So SAPs ***hurt the poor most***, because they depend heavily on these services and subsidies.

SAPs ***encourage*** countries to focus on the ***production and export of primary commodities such as cocoa and coffe*****e** to earn foreign exchange. But these commodities have **notoriously erratic prices** subject to the whims of global markets which can depress prices just when countries have invested in these so-called 'cash crops'.

By ***devaluing the currency*** and simultaneously ***removing price controls***, the immediate effect of a SAP is generally to hike prices up three or four times, ***increasing poverty*** to such an extent that riots are a frequent result. SAPs are based on a short-term, profit-maximization model that perpetuates poverty, inequality, and environmental degradation.

The term "Structural Adjustment Program" has gained such a ***negative connotation*** that the World Bank and IMF launched a new initiative, the Poverty Reduction Strategy Initiative, and makes countries develop *Poverty Reduction Strategy Papers* (PRSP).

While the name has changed, with PRSPs, the World Bank is still forcing countries to adopt the same types of policies as SAPs.

- Social safety nets and good governance reforms do not compensate for the serious flaws that SAPs introduce by deregulating laws and diminishing the state's capacity to protect the welfare of its citizens.

2.6 Towards General Theory of Development

All the theories discussed in the preceding sections are only partial theories. They explain certain aspects but do not fully explain the cause of underdevelopment. The explanation is more adequate for certain historical situations and specific conditions of production while they are less relevant for others. They offer a strategy for overcoming the prevailing situation and initiating development which may be suitable under certain economic and social conditions but are not applicable to others. A general theory of development is still lacking.

Drawing up such a general theory is indeed a difficult task; it would have to include;

- an explanation of underdevelopment for different countries;
- an explanation of the development process of industrialized countries; and
- a strategy for overcoming underdevelopment in developing countries

As well, it would have to include;

- all relevant disciplines and their interdependence;
- the different levels at which development takes place, from the

  local to the international level;
- the processes and relations between the different sectors and strata

  of society and economy; and
- the international dimensions of the development process

While the system theory opens up the possibility of organizing such a vast theoretical body, the activities of different researchers hitherto have not yet been successful. Even in the absence of a concise theory to guide political activities, decision-makers must have some yardsticks to

measure whether their strategies and tools will achieve the goals of the society. Here, goals play an important role. While, in detail, the question of goals in the development process is a political question, and difference of opinion and conflict are possible, at a high level of abstraction, universal agreement seems to be possible.

It is widely agreed that preservation of human dignity and fulfillment of basic needs are the foremost duties of every society. While there is wide agreement on this goal, differences of opinion exist on the question of the degree to which these basics should be supplied and, as well, how they should be supplied. These differences allow for different paths of development.

From the common denominator "basic needs," one can deduct five basic goals of development:

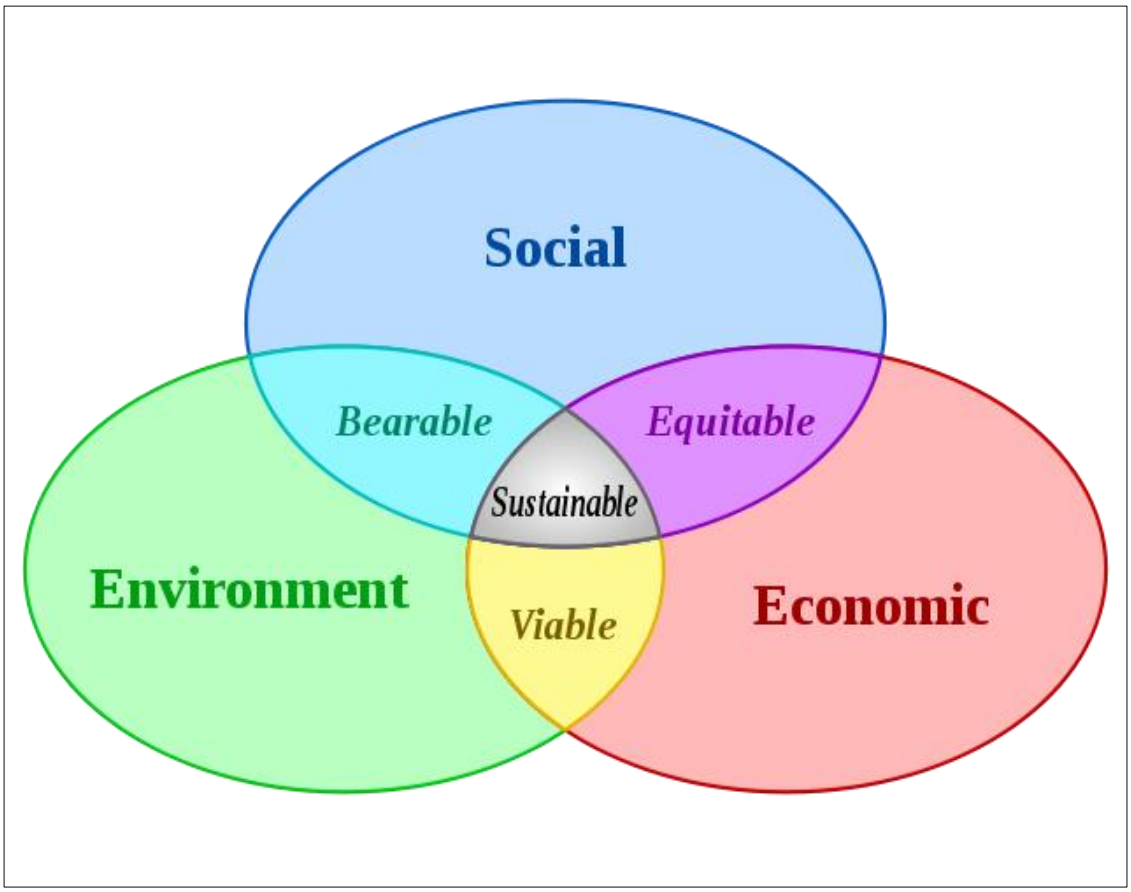
- Economic growth to secure food and other requirements for the population;
- Social justice to reduce inequality;
- Employment as means of earning an income but, as well, because of its ethical and social value;
- Participation as political involvement and social sharing;
- Independence as freedom from external domination.

While individual societies may have different opinions on the priorities of these goals, in the absence of a general theory of development; one can use the criterion of fulfillment of these goals as a yardstick in development. Development is then understood as a simultaneous progress towards these five goals.

Finally, development can be depicted, as on the following figure, being;

- Socially and economically equitable
- Socially and environmentally bearable
- Environmentally and economically viable

- Above all development should be **sustainable** by integrating social, economic and environmental components as indicated on the figure below.



CHAPTER THREE: LINKAGES BETWEEN ENVIRONMENT AND DEVELOPMENT

3.1 The concept of sustainable development

The concept of sustainable development is can hardly be understood in separation from the concept of environment or vice versa. As a result of this (World Commission on Environment and Development, 1987) explains that the **environment** does not exist as a sphere separate from human actions, ambitions, and needs and attempts to defend it in isolation from human concerns have given the very word "environment" a connotation of naivety in some political circles. The word "**development**" has also been narrowed by some into a very limited focus, along the lines of "what poor nations should do to become richer," and thus again is automatically dismissed by many in the international arena as being a concern of specialists, of those involved in questions of "development assistance." But the "environment" is where we live; and "development" is what we all do in attempting to improve our lot within that abode. The two are inseparable.

The term sustainable development was introduced to the international community in "***Our Common Future***"; the 1987 report of the ***Brundtland Commission*** which was chaired by Norwegian Prime Minister Gro Harlem Brundtland (and consequently called Brundtland Commission) defined Sustainable Development as:

> *Sustainable development* is *meeting the needs of the present generation without compromising the ability of the future generations to meet their needs.*

Sustainable development doesn't focus only on environmental issues. According to, (World Commission on Environment and Development, 1987) more broadly, sustainable development encompasses three ***general policy areas***: economic, environment and social. Thus, interdependent and mutually reinforcing pillars of **sustainable development** are:

i. economic development,
ii. social development and
iii. environmental protection

According to (UNESCO, 2006), it is stated that ***cultural diversity*** is as necessary for human kind ***as biodiversity for nature***. Therefore, cultural diversity is the ***fourth policy area of sustainable development.***

The environment consisting of land, water, air, biodiversity etc., is linked with the ***survival of society*** and thus ***inevitably with development***.

Some argue that destruction of environment is the result of ***civilization***. On the contrary, there is contention that development can be obtained by ***sustainable utilization of natural resources***. The concept blends two concepts: ***conservation*** and ***development***.

Although development and conservation are related, it is also clear that they can ***come into conflict*** in that conservation implies some preservation while development implies using natural resources.

Thus, sustainability is the question of ***understanding*** and ***handling*** these con***tradiction and interdependence*** without letting them turn into antagonism.

In other words, sustainable development is aimed at:

1. ***Demographic transition*** to stable population of low birth and death rates.
2. An ***energy transition*** to high efficiency in production and use, coupled with increasing reliance on renewable resources.
3. A ***resource transition*** to reliance on nature's 'income' without depleting its capitals.
4. An **economic transition** to SD and a broad sharing of the benefits of development.
5. A ***political transition*** to global negotiation grounded in complementary interests between north and south & east and west.
6. An ***ethnic and spiritual transition*** to attitude that do not separate us from nature and each.

3.2 Sustainable Development and Environmental Accounting/Auditing

Environmentalists have used the term sustainability in an attempt to clarify the desired ***balance*** between ***economic growth*** on one hand and ***environmental preservation*** on the other. ***Sustainability*** refers to meeting the needs of the present generation without compromising the needs of the future generations. For economists, a ***development path is sustainable***" if and only if the stock of ***overall capital assets*** remains ***constant*** or ***rises*** over time. Implicit in this statement is the fact that future ***growth*** and overall ***quality of life*** are critically dependent on the ***quality of the environment***. The natural resource base of the country and quality of air, water and land represents a ***common heritage*** of all the generations. Therefore, development policy makers should incorporate some ***form*** of ***environmental accounting*** in their decisions.

For example the ***preservation or loss of valuable environmental resources*** should be factorized into estimates of economic growth and human wellbeing. Policy may set a goal of ***no net loss environmental assets***. In other words if a resource is ***damaged or depleted in one area,*** a resource of equal or greater value should be regenerated elsewhere.

Overall capital assets are meant to include not only ***manufactured capital*** (machines, factory, roads…) but also ***human capital*** (knowledge, experience, skill) and ***environmental capital*** (forests, soil quality, range land). Sustainable Development requires that these overall assets not be decreasing.

Thus, sustainable national income or sustainable net national product (NNP) is the amount that can be consumed without diminishing the capital stock.

3.2.1 Incorporating Measures of Environmental Depreciation into GNP

NNP*=GNP-Dm-Dn,

Where NNP* is sustainable national income

Dm-deprecation of manufactured capital assets (physical capital stock/manmade stock)

Dn- is deprecation of Natural capital stock (environmental capital stock) – the monetary value of environmental decay over the course of time.

Even better measure, though more difficult to calculate is:

NNP* = GNP-Dm-Dn-R-A, where,

R- Expenditure required to restore environmental capital

A- Expenditure required to avert destruction of environmental capital

- ***Measuring Dm: -***
  - first the value of manufactured capital stock is measured by the cost of production of all the capital goods in the economy
  - then the rate of depreciation is determined (say the capital may last 15-20years)
  - the depreciation of the manufactured capital stock per year equals the value of the manufactured capital stock multiplied by the depreciation rate
- ***Measuring Dn:*** - **Dn** cannot be measured in the same way as **Dm**. Because the natural capital stock **has no cost of production** (no body created it). Depreciation could equal the cost of replacement of the natural capital. E.g. the deprecation of a forest trees could be valued as the cost of replacing the forest; however, this is impossible for some resources such as pollution of the atmosphere.

- *However, **Dn is measured as follows:***
  - Each piece of the natural capital is valued as **discounted stream of revenue** that can be extracted from it. The value of forest is the stream of revenue generated from logging. Some natural capital is not valued; there is no way to evaluate the stream of values it produces such as the atmosphere.
  - The fraction of the stream of revenue that is depleted is determined. If 10% of the forest is logged, then 10% of the forest is depleted.

3.2.2 Environmental accounting:

***Accounting:* -** the process of identifying, measuring, recording, and communicating economic information about an organization or other entity, in order to permit informed judgments by users of the information. Therefore, environmental accounting refers to quantitatively evaluating the costs and benefits of environmental activities. It is to promote understanding of the **link between economy and environment.**

3.2.3 Environmental auditing

Environmental auditing is the process of regular and occasional examination and assessment of government organizations programs, activities, or functions in relation to environment order to provide the councils with **independent information** to improve environmental protection processes and encourage best practice which lead to ***sustainable development***. It is also to help ***audited bodies*** improve their environmental protection policies and programs which meet the needs of present and future generations.

Environmental auditing is an extremely valuable tool for assessing a company's environmental management system against the standards and polices set.

- is being used as a tool and an aid to test the ***effectiveness of environmental efforts*** at local level
- is a ***systematic***, ***independent internal review*** to check whether the results of environmental work ***tally*** with the ***targets***
- It also focuses on whether the ***methods used to achieve goals*** are effective.

To be more precise the work of an environmental audit is ***a study of documents and reports*** to see whether there are any deviations between targets and results.

- It is mandatory only in cases stipulated by law.

The concept of environmental auditing is closely related to monitoring, norms and standards as shown on the following table.

3.2.4 Nature's Services

Nature's services are an umbrella term for the ways in which nature benefits humans, particularly those benefits that can be ***measured in economic terms***.

Ecosystems are more than Wildlife Habitat

Ecosystem services are the processes through which natural ecosystems, and the plants, animals and microbes that live in those environments, ***sustain human life***.

- **Ecosystem services:**
    - produce ***goods, timber, and fibers, medicines and fuels***
    - conduct life-support activities, like:
        - filtering water and
        - recycling all kinds of wastes
    - support the growth and reproduction of food plants,
    - control pests, and
    - moderate the weather
    - waste decomposition and
    - flood control

Technology may duplicate these services temporarily, but it's doubtful that technological advances will be able to continually compensate for the large-scale loss of natural services.

3.2.5 Wetlands: Water Purification System and Natural Flood Control

Although it is ***difficult to put a price tag*** on a wetland, forest, or river, the "price" for ***failing to protect or nurture*** these natural services could be daunting.

Most wetlands are linked intricately with our groundwater and surface water supplies.

- wetlands continue to provide crucial ecological services, including:
  - filtering and conserving water,
  - flood control, and
  - shelter and food for fish and wildlife
  - maintaining cycles essential for life on earth, such as:
    - the carbon,
    - methane,
    - nitrogen, and
    - sulfur cycles

Resource managers now realize that ***preservation and restoration*** of wetlands and natural waterways may be a more ***cost effective means of maintaining drinking water quality than expensive water treatment technologies.***

Today, New York City faces such a choice. The City's clean, clear water, which originates in the Catskill Mountains, is in jeopardy of failing drinking water standards. After exploring the technological and natural options for filtering water, **New York City chose a watershed protection approach** that preserves and restores nature's services. It's a choice that will affect every New Yorker, as well as the state's rural residents.

- ***Note: -*** *Before it became* ***overwhelmed by agricultural and sewage runoff,*** *the watershed of the Catskill Mountains provided New York City with water* ***ranked among the best*** *in the Nation by* ***Consumer Reports****. When the water fell below quality standards, the City investigated what it would* ***cost to install an artificial filtration plant****. The* ***estimated price tag*** *for this new facility was* ***six to eight billion dollars****, plus* ***annual operating costs of 300 million dollars*** *-* ***a high price to pay for what once was free****.*

Communities across the nation and worldwide are ***facing similar choices*** between protecting natural resources that provide services humans need or implementing expensive technological solutions.

The choices we make today in how we use land and water resources will have enormous consequences on the future sustainability of earth's ecosystems and the services they provide.

B. Forests: Our Carbon Reserves

Natural services provided by forests **go beyond *shade*, *timber, and wildlife habitat***.

- help stabilize landscapes by protecting soils and retaining moisture
- for carbon storage,
- for nutrient cycling, and
- help moderate local and regional climate through rainfall
- moderate global warming
- regulate the water cycle
- many medicines have been isolated from plant compounds
- Control pest
    - Malaria-carrying mosquitoes are normally consumed by a wide variety of reptiles, birds, bats, and fish. Forest clearing removes habitat for these creatures, but clears the way for standing water where mosquitoes can breed freely.

3.2.6 Valuing Nature: What Would You Pay?

How much would you pay:

- to save a local wetland or a tract of tropical rain forest?
- to protect the clean air that you are breathing?
- to protect the clean water that you are drinking?
    - For your healthy as a result of clean air and water.
- to protect the satisfaction that you obtain from recreational values of nature?

How much would your neighbor pay?

You and your neighbor may not agree about what's important in that wetland or forest. It's ***not easy to put a price tag*** on a wetland and every wetland probably has a ***different value.*** It's important, however, to understand the value of a natural resource if it's to be preserved, continue functioning and effectively providing ecological services.

- There are basically three categories of services and benefits, with some easier to price than others.
    - **Products**, like fish or timber, are fairly easy to quantify, compared with **services** like nutrient cycling or water purification. Even harder to grasp in terms of economic value are the **recreational, aesthetic and spiritual benefits** humans gain from the natural world.

Direct, ***consumptive use values*** apply to products from natural ecosystems that are harvested and sold commercially, such as fish or lumber. ***Direct, non-consumptive use values*** also are fairly easy to understand, but a bit harder to calculate. The benefits of bird watching, hiking and sightseeing can be calculated, based on how much it costs to travel to the accommodating habitats. The most difficult ones are ***indirect values***. In the case of wilderness area, indirect values include the enjoyment that other people obtain through watching a television showing about the area and its wildlife.

3.3 Population, Resource, Environment and Development

There is always a ***controversy*** in the interrelationship among population, resource environment and development. The ***main concern*** over environmental issues ***stems*** from the perception that we may ***reach a limit*** to the number of people whose needs can be met by the earth's finite resources. This may or may not be true, given the potential for new technological innovations.

However, it is clear that ***continuing in our present path of accelerating environmental degradation*** would severely compromise the ability of both present and future generations to meet their needs.

People's sole existence and ***property*** depends on the availability of natural resources, irrespective of how they are obtained be it through purchasing or self-harvesting. **What we breath, eat, drink, wear, shelter and other materials** being utilized are primarily natural resources, in the absence of which there is no life, development or prosperity.

People are both ***the subject and bases*** of development. Development is **directed at improving socio-economic wellbeing** of people. At the same time people are **agents** of development. It is people who make development possible. To this effect, adequate quality and quantity of human resources are essential. If we **lack adequate quantity and quality** of human labor, national economies **may fail to attain their full growth potential**. If too few people are available, we may not be able to exploit all the **existing opportunities** adequately.

Investment on human resources have a direct bearing on the **pace and patterns** of economic growth. Education and training bring new knowledge and skill and lead to improved use of machinery and equipment and to increased productivity.

In other respects, rapid population growth may hinder development as:

- High population size depletes available resources **before they are fully developed and made more productive.**
- High population growth rate leads to **greater degree of completion** for resources which may result in wastage of resources.
- Natural resources have **limited carrying capacity** (potentiality of a resource system to support growing population at increasing standard of living), beyond which the consequences may be famine, calamities, etc.

Carrying capacity depends on technology. What one time may be a problem of population pressure may subsequently become one of the relative abundance with the use of new technologies. Modern technologies **use fewer resources** and **allowed fewer wastages** per unit of product than old ones.

3.4 Poverty and Environment

Poverty is as difficult to be defined as the problem itself. But for better understanding, poverty can be seen from two perspectives: **absolute** and **relative** dimensions.

Absolute poverty refers to the inability to meet minimum human needs such as food, cloth, health care, shelters, etc. Generally, it is lack of basic necessity for survival.

Relative poverty refers to the inability to attain a given contemporary standards of living.

It is understandable why people who are hungry, ill, unemployed and lacking the elementary amenities of life **show little interest** in environmental considerations. Because they are **preoccupied with** their own acute problems of poverty the poorest people are too often forced to meet **short term survival needs** at the expense of sustainability. In the period of prolonged and severe food shortages, the **disparately hunger farmers have been known to eat the seeds** with which they would have planted the next year's crops, knowingly paving the way for further disaster. The ***tendency of poor people to degrade different resources*** on which they depend for survival is motivated by similar circumstances.

That is why it is commonly said that ***poverty is the major environmental hazard***. Thus, ***for environmental policies to succeed*** in less developed countries, they must first address the issue of land less ness, poverty and lack of access to institutional resources.

Some argue that ***environment is the concern of only industrialized countries*** because environment can be considered as a ***luxury good***. Developing countries will become concerned about environment only after a certain level of income.

However, environmental problems have global effects. Although environmental degradation threatens all humanity, even people living in the less developing countries are ***often most vulnerable*** to its effects. Because large portion of these people are ***directly dependent on activities*** such as agriculture, forestry and fishery for their survival and wellbeing these

activities depend on ***healthy ecological systems*** and there are ***few buffers to protect the poor*** from the repercussions of environmental deteriorations.

3.5 Growth versus Environment

Economic growth has somewhat ***perplexing*** (puzzling/confusing) ***relationship*** with environmental wellbeing. It is already believed that it is ***possible to reduce environmental destruction by increasing the income of the poor***. But is it possible to achieve growth without further damage to the environment?

Evidences indicate that the worst perpetrators (criminals) of environmental destruction are the ***billion richest*** and the ***billion poorest*** people on earth. It has been suggested that ***the billion bottom people are more destructive than all four billions in between***. Thus, improving the economic status of the poorest will provide an environmental windfall (unexpected good future).

However, as **income and consumption** levels of everyone else in the economy increase, there is ***likely to be a net increase in environmental destruction***. As a result, at least, meeting increasing consumption demand while ***keeping environmental degradation at minimum level will not be a simple task.***

3.6 Rural Development and Environment

There are two possible ways of increasing agricultural production:

1. Increasing yield per unit area through improving the productivity of the land under farming; and
2. Increasing yield through expansion of the size of farming land; E.g.
    a. Through putting marginal lands in to use.
    b. Through expanding farm areas into forest and grass lands.

The technological breakthrough of the 1960s and 1970s, known as ***Green Revolution***, falls in the first category. This was possible as a result of ***painstaking*** and ***outstanding research*** on crops genetics in several of world's agricultural research institutions.

Example,

- Norman Borlaug's wheat program in Mexico.
- International Rice Research Institution in Philippines

The research in these institutions succeeded in breeding ***high yield varieties*** (HYV) of cereals. The Green Revolution required planting of HYV with large inputs of water, fertilizers and pesticides.

- The application of more fertilizers and pesticides ***increased water pollutions*** (both surface and subsurface).
- Green Revolution results in ***reduction in Genetic diversity***
- Green Revolution results in development of ***pesticide resistant plants***. This encourages wider utilization of pesticides.

Potential for land degradation increases with farming marginal lands to agriculture. ***Marginal lands***: are lands which are not fertile enough for profitable farming except when price of agricultural increase. Marginal lands include:

- Steep slopes
- Moist deficit areas but agriculture is possible with irrigation and
- Dry areas with rather limited potential for farming.
    - E.g. Sahara and Atacama deserts have extremely limited potential for farming.
    - The Sahel of Africa which includes parts of ***Mauritania***, ***Senegal***, ***Niger***, ***Mali***, ***Burkina Faso*** and ***Chad*** are the ***best example*** of this type of land.

Expansion of farm lands for ***shifting cultivation***, ***ranching***, ***commercial plantation***, etc is the ***major cause*** for deforestation and subsequent multiple environmental problems.

The root cause of rural environmental destruction is frequently ***poverty***.

- ***Increased accessibility of agricultural inputs*** to small farmers and the ***introduction of sustainable method of farming*** will create attractive alternatives to current environmental destructive patterns of resources use
- ***Women are frequently care takers*** of rural resources such as forests and water and hence rural development should ensure that women are ***integrated to environmental programs***.

3.7 Urban Development and Environment

In the developing countries, ***rapid population growth accompanied by heavy rural-urban migration*** is leading to ***unprecedented rate*** of urban population growth. Consequently, few governments are prepared to cope with the vastly increased pressure on existing water supplies, sanitation facilities, housing conditions, transport facilities etc. In other words, in many urban areas of less developed countries, the necessary services fail to keep pace with the rising population.

Failure to balance urban population growth with necessary social amenities lead to:

- Extreme health hazard
- Construction of many illegal and unplanned houses
- Congestion
- Pollution (both water and air)
- Increased flooding
- Slope failures

In the 21st century cities of the LDCs may very well turn out to be one of the ***major problem areas of environmental management***, along with global warming and the loss of tropical forests.

In a nutshell, types of major environmental modifications rising out of rapid urbanization include:

1. **hydrological change:-**
    a. increased surface run off

b. increased flood intensity

c. depletion of subsurface water

2. **Geomorphological changes**

    a. Accelerated sediment production

    b. Slope intensity

    c. Modification of natural channel

3. **Climate changes**

    a. less radiation received

    b. increased temperature and heat island effect

    c. increased cloudiness

    d. increased perception

    e. reduced wind speed

4. **Change in vegetation**: - introduction of exotic species

5. **Air quality changes**

    a. increase of contaminants

    b. increase of solid particles

    c. increase of add mixtures

6. **Water quality changes**

    a. waste water from domestic sources

    b. waste water from industries

3.8 Traditional Economic Models of the Environment

Privately owned Resources

Neoclassical theory has been applied to **environmental issues** to determine:

- What conditions are necessary for the efficient allocation of resources,
- How market failures lead to inefficiencies and

- To suggest ways in which those distortions can be corrected.

Market determines the optimal consumption of a natural resource. Finding the optimal market income involves maximizing the **total net benefits** to society from a resource which is the difference between **total benefits** derived from the resource and the **total cost** to producers of providing it. Total net benefits is maximized when the **marginal cost of producing or extracting** one more unit of the resource is equal to its **marginal benefits to the consumer**.

Proponents of neoclassical free market theory stress those inefficiencies in the allocation of resources resulting from ***impediments to the operation of free market*** or *imperfections in the property right system*. So long as resources are privately owned and there are not market distortions, resources will be allocated efficiently. ***Perfect property rights markets*** are characterized by four conditions:

- Universality- all resources are privately owned
- Exclusively- it must be possible to prevent others from being a privately owned resources
- Transferability- the owners of the resources may sell the resource when desired.
- Enforceability- the intended market distribution of resources must be enforceable

Under these conditions, the owner of scarce resources has an ***economic incentive*** to maximize the net benefit from its sale or use.

If the ***foregoing conditions are not met simultaneously***, inefficiencies are likely to arise. Thus, the way to correct the misallocation of resources is generally to remove any market distortions. A number of ***models are designed to explain inefficiencies*** in resources. Two of these models are:

1. Common property resources and
2. Public goods and bads: Regional Environmental degradation and the free rider problem

Common property resources

If a scarce resource (such as arable land) is publicly owned and thus freely available to all, ***any potential profits*** will be competed away during which inefficiencies will arise.

The ***implication of common property resource model*** is that where possible, privatization of resources will lead to an ***increase in aggregate welfare*** and an ***efficient allocation of resources***. In the case of farmers, they may be reluctant to make **land augmenting investments** if they are **afraid of losing tenure land property** plot. Due to **lack of collateral**, they may have inefficient funds to purchase complementary resources.

Public goods and bads: Regional Environmental degradation and the free rider problem

An **externality** occurs when one person's consumption or production behavior affects that of another **without any compensation**. The benefits and costs of one's actions are said to be **internalized** when one is made to **bear them in full. A public good** is anything that provides a benefit to everyone and the availability of which in no way diminished by its simultaneous enjoyment by others. Common example is **clean air** and **national defense**. **A public bad** is any product or condition that decreases the wellbeing of others. Air pollution and water pollution are examples. If individuals do not pay the full costs associated with their actions, too much of public bad will be produced. Regional environmental degradation is public bad. Regional environmental degradation caused by deforestation in turn causes increased exposure to the forces of erosion, excessive dying of the soil, regional loss of ground water, silting and potential climate change.

To the contrary, environmental conservation through the property of trees provides benefits to all and thus a public good. **Free rider problem** – is a situation in which people secures benefits that someone else pays for.

CHAPTER FOUR: POVERTY AND INEQUALITY

4.1 The Concepts of Well-Being and Poverty

According to (The World Bank, 2011) poverty is defined as "… ***a pronounced deprivation in wellbeing***." This of course requests the questions of what is meant by well-being and of what is the reference point against which to measure deprivation.

There are different approaches to treat well-being. One approach is to think of well-being as the command over commodities in general, so people are better off if they have a greater command over resources. The main focus is on whether households or individuals have enough resources to meet their **needs**. Typically, poverty is then measured by comparing individuals' income or consumption with some defined threshold below which they are considered to be **poor**. This is the most conventional view—poverty is seen largely in monetary terms—and is the starting point for most analyses of poverty.

A second approach to well-being (and hence poverty) is to ask whether people are able to obtain a specific type of consumption good:

- Do they have enough food?
- Or shelter?
- Or health care?
- Or education?

In this view the analyst goes beyond the more traditional monetary measures of poverty: Nutritional poverty might be measured by examining whether children are stunted or wasted; and educational poverty might be measured by asking whether people are literate or how much formal schooling they have received.

According to (The World Bank, 2011) Perhaps the broadest approach to well-being is the one articulated by Amartya Sen (1987), who argues that *well-being comes from a capability to function in society.* Thus, **poverty** arises when people lack key **capabilities**, and so have either or all of the following in capabilities:

- **inadequate income or**
- **education**, or
- **poor health**, or
- **insecurity**, or
- **low self-confidence**, or
- **a sense of powerlessness**, or
- **the absence of rights such as freedom of speech**

When viewed in this way, poverty is a multidimensional phenomenon and less amenable to simple solutions. For instance, while higher average incomes will certainly help reduce poverty, these may need to be accompanied by measures to **empower the poor**, or **insure them against risks**, or to address specific weaknesses such as inadequate availability of schools or a corrupt health service.

4.2 Poverty, Inequality and Vulnerability

Poverty is related to, but distinct from, **inequality** and **vulnerability**. Inequality focuses on the distribution of attributes, such as **income** or **consumption**, across the whole population. In the context of poverty analysis, inequality requires examination if one believes that the welfare of individuals depends on their economic position relative to others in society. **Vulnerability** is defined as *the risk of falling into poverty in the future, even if the person is not necessarily poor now*; it is often associated with the effects of "**shocks**" such as:

- **drought**,
- **drop in farm prices**, or
- **financial crisis**

Vulnerability is a key dimension of well-being since it affects individuals' behavior in terms of investment, production patterns, and coping strategies, and in terms of the perceptions of their own situations.

4.3 Measuring Poverty

Measuring poverty is one of the most difficult tasks in poverty analysis. This is because it takes time, energy and money to measure poverty and since it can only be done properly by gathering survey data directly from households it becomes more complex to measure the variable. However, we need to measure poverty for the following reasons.

1. Keeping Poor People on the Agenda

A credible measure of poverty can be a powerful instrument for focusing the attention of policy makers on the living conditions of the poor. In other words, it is easy to ignore the poor if they are statistically invisible. The measurement of poverty is necessary if it is to appear on the political and economic agenda.

2. Targeting Domestic and Worldwide Interventions

A second reason for measuring poverty is to target interventions. Obviously, one cannot help poor people without knowing who they are. This is the purpose of a poverty profile, which sets out the major facts on poverty and inequality, and then examines the pattern of poverty to see how it varies by geography (for example, by region, urban/rural, mountain/plain), by community characteristics (for example, in communities with and without a school), and by household

characteristics (for example, by education of household head, by size of household). A well-presented poverty profile is invaluable, even though it typically uses rather basic techniques such as tables and graphs.

3. Monitoring and Evaluating Projects and Policy Interventions

The third reason for measuring poverty is to be able to predict the effects of, and then evaluate, policies and programs designed to help poor people. Policies that look good on paper - new opportunities for microcredit for the poor, for instance - may in practice not work as well as expected. To judge the effects, one would ideally like to monitor the effects of a policy on poor people and evaluate the outcomes in comparison with a control group. Rigorous analysis of this kind is needed both to improve the design of projects and programs and to get rid of ones that are not working.

4. Evaluating the Effectiveness of Institutions

The fourth reason for measuring poverty is to help evaluate institutions. One cannot tell if a government is doing a good job of combating poverty unless there is solid information on poverty. When evaluating projects, policies, and instruments, our concern is with poverty comparisons. In this context, we typically want to know whether poverty has fallen (a qualitative measure) and by how much (a quantitative measure).

Then the first step in measuring poverty is defining an **indicator** of welfare such as **income** or **consumption** per capita. Information on welfare is derived from survey data. Therefore, note that good survey design is important!

Three steps need to be taken in measuring poverty:

1. Defining an indicator of welfare

2. Establishing a minimum acceptable standard of that indicator to separate the **poor** from the **non-poor** (the poverty line)

3. Generating a summary statistic to aggregate the information from the distribution of this welfare indicator relative to the poverty line.

1. Choosing an Indicator of Welfare

There are a number of ways to measure well-being. The most widely used approach is the one that seeks to measure household *utility*, which in turn is usually assumed to be approximated by household consumption expenditure or household income; these may be considered as ***inputs*** into generating **utility**. It is based on the fact that given enough income, the household is assumed to know best how to spend these resources, whether on food, clothing, housing, or the like. When divided by the number of household members, this gives a per capita measure of consumption expenditure or income.

A more paternalistic, or non welfarist, approach might focus on whether households have attained certain minimal levels of, say, nutrition or health. Thus, while the welfarist approach focuses on per capita consumption expenditure or income, other (non welfarist) measures of individual welfare might include indicators such as infant mortality rates in the region, life expectancy, the proportion of spending devoted to food, housing conditions, or child schooling; these may be thought of as measures of *output*, reflections of utility rather than inputs into the generation of utility.

If we choose to assess poverty based on household consumption or expenditure per capita, it is helpful to think in terms of an expenditure function, which shows the minimum expense required to meet a given level of utility $\boldsymbol{u}$, which is derived from a vector of goods $\boldsymbol{x}$, at prices $\boldsymbol{p}$. It can be

obtained from an optimization problem in which the objective function (expenditure) is minimized subject to a set level of utility, in a framework where prices are fixed.

Let the consumption measure for the household ***i*** be denoted by y_i. Then an expenditure measure of welfare may be denoted by: $y_i = p \cdot q = e(p, x, u)$, where ***p*** is a vector of prices of goods and services, ***q*** is a vector of quantities of goods and services consumed, ***e(.)*** is an expenditure function, ***x*** is a vector of household characteristics (number of adults, number of young children, and so on), and ***u*** is the level of "utility" or well-being achieved by the household. In another way, given the prices **(*p*)** that it faces, and its demographic characteristics **(*x*)**, y_i measures the spending that is needed to reach utility level ***u***. Normally, we compute the actual level of y_i from household survey data that include information on consumption. Once we have computed y_i , we can construct *per capita* household consumption for every individual in the household, which implicitly assumes that consumption is shared equally among household members. For this approach to make sense, we must also assume that all individuals in the household have the **same needs**. This is a strong assumption, for in reality, different individuals have different needs based on their individual characteristics.

2. Defining a Poverty Line

Assuming we have chosen a measure of household well-being consumption expenditure. The next step is to choose a poverty line. Households whose consumption expenditure falls below this line are considered **poor**. The choice of poverty line depends in large measure on the intended use of the poverty rates. If the goal is to identify "the poor" for a targeted system of food subsidies, a line that generates a poverty rate of 60 percent, or of 2 percent, is unlikely to be helpful. In this sense, the poverty rate is indeed a social and policy construct, and appropriately so. However, it is common practice to *define the poor as those who lack command over basic consumption needs, including food and nonfood components*. In this case the poverty line is

obtained by specifying a consumption package considered adequate for basic consumption needs, then estimating the cost of these basic needs. The poverty line for a household, z_i, may be defined as the minimum spending or consumption (or income, or other measure) needed to achieve at least the minimum utility level u_z, given the level of prices (p) and the demographic characteristics of the household (x), so $z_i = e(p, x, u_z)$.

In practice, we cannot measure u_z, or even $e(\cdot)$, so a more pragmatic solution is needed. There are two approaches. One is to compute a poverty line for each household, adjusting it from household to household to take into account differences in the prices they face and their demographic composition. For example, a small household in a rural area may face low housing costs and relatively modest food prices. Thus, their z_i may be low compared with a large household in a city where housing is more expensive and food prices are perhaps higher. This gives a different poverty line for each household. Poverty line may be thought of as the minimum expenditure required by an individual to fulfill his or her basic food and nonfood needs.

Once we have computed a household's consumption, we need to determine whether that amount places the household in poverty, or defines the household as poor. The threshold used for this is **the poverty line**. The poverty line defines the level of consumption (or income) needed for a household to escape poverty. It is sometimes argued that the notion of a poverty line implies a distinct turning point in the welfare function. That is, by rising from just below to just above the poverty line, households (and individuals therein) move from considerable misery to an adequate minimum amount of well-being. However, given that well-being follows a continuum, and given how arbitrary the choice of poverty line is, the notion of such a turning point is not compelling. A consequence is that it usually makes sense to define more than one poverty line. For example, one common approach is to define one poverty line that marks households that are **poor** and

another lower level that marks those that are **extremely poor**. Another approach is to construct a food poverty line, which is based on some notion of the minimum amount of money a household needs to purchase some basic needs - food package and nothing more. If the cost of basic nonfood needs is estimated, the food poverty line added to the nonfood needs will equal the overall poverty line.

4.4 Relative Poverty

Sometimes we are interested in focusing on the poorest segment (for example, poorest one-fifth or two-fifths) of the population; these are the relatively poor. When defined in this way, it is a truism that "the poor are always with us." It is often helpful to have a measure such as this to target programs geared to helping the poor.

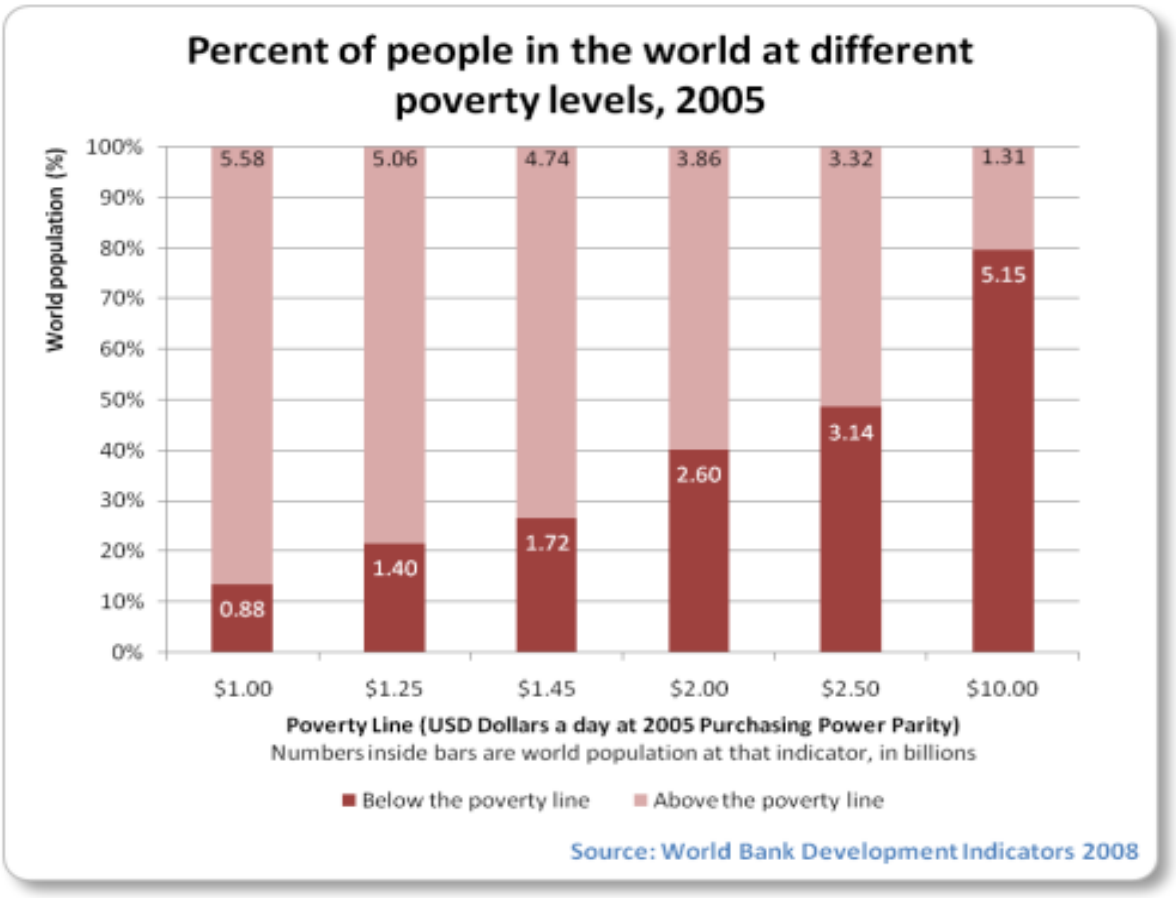
In practice, rich countries have higher poverty lines than do poor countries. This explains why, for instance, the official poverty rate in the early 1990s was close to 15 percent in the United States and also close to 15 percent in much poorer Indonesia. Many of those counted as poor in the United States would be considered comfortably well-off by Indonesian standards.

As countries become better off they have a tendency to revise the poverty line upward - with the notable exception of the United States where the line has (in principle) remained unchanged for four decades. For instance, the European Union typically defines the **poor** as those whose per capita income falls below 50 percent of the **median**. As the median income rises, so does the poverty line, so this is more properly viewed as a crude measure of inequality rather than of absolute poverty.

4.5 Absolute Poverty

An absolute poverty line is “fixed in terms of the standards indicator being used and fixed over the entire domain of the poverty comparison”. In other words, the poverty line is set so that it represents the same purchasing power year after year, but this fixed line may differ from country to country or region to region (the “domain” of the relevant comparison). For example, the U.S. poverty line does not change over time (except to adjust for inflation), so that the poverty rate today may be compared with the poverty rate of a decade ago, knowing that the definition of what constitutes poverty has not changed.

An absolute poverty line is essential if one is trying to judge the effect of antipoverty policies over time, or to estimate the impact of a project (for example, microcredit) on poverty. Legitimate comparisons of poverty rates between one country and another can only be made if the same absolute poverty line is used in both countries. Thus, major institutions like the World Bank needs absolute poverty lines to be able to compare poverty rates across countries. Such comparisons are useful in determining where to channel resources, and in assessing progress in the war on poverty. The World Bank for instance has recently revised its measurement of world poverty and use a poverty rate of US$1.25 a day (in 2005 U.S. dollars prices), and by this standard there were 1.38 billion poor in 2005. If the poverty line is set at US$2.00 a day, this number rises to 2.09 billion. These are **absolute poverty lines** (see the following table). There is a vigorous controversy about whether world poverty is indeed falling (The World Bank, 2011).



Source: (Global Issues, 2010)

Furhermore, the United Nations, further defines absolute poverty as the absence of any two of the following eight basic needs:

- *Food:* Body Mass Index must be above 16.
- *Safe drinking water:* Water must not come from solely rivers and ponds, and must be available nearby (less than 15 minutes' walk each way).
- *Sanitation facilities:* Toilets or latrines must be accessible in or near the home.
- *Health:* Treatment must be received for serious illnesses and pregnancy.
- *Shelter:* Homes must have fewer than four people living in each room. Floors must not be made of dirt, mud, or clay.

- *Education:* Everyone must attend school or otherwise learn to read.
- *Information:* Everyone must have access to newspapers, radios, televisions, computers, or telephones at home.
- *Access to services:* This item is undefined by Gordon, but normally is used to indicate the complete panoply of education, health, legal, social, and financial (credit) services.

For example, a person who lives in a home with a mud floor is considered severely deprived of shelter. A person who never attended school and cannot read is considered severely deprived of education. A person who has no newspaper, radio, television, or telephone is considered severely deprived of information. All people who meet any two of these conditions — for example, they live in homes with mud floors *and* cannot read — are considered to be living in absolute poverty.

4.6 Other Measures of Household Welfare

Even if they were measured perfectly, neither income nor expenditure would be an ideal measure of household well-being. For instance, neither measure puts a value on the leisure time enjoyed by the household; neither measures the value of publicly provided goods (such as education, or public health services); and neither values intangibles such as peace and security.

Other possible measures of well-being include the following:

• Calories consumed per person per day.

If one accepts the (non welfarist) notion that adequate nutrition is a prerequisite for a decent level of well-being, then we could just look at the quantity of calories consumed per person. Anyone consuming less than a reasonable minimum - often set at ***2,100 Calories per person per day*** - would be considered **poor**. Quickly viewing, this is an attractive idea, however, it is not always easy to measure calorie intake, particularly if one wants to distinguish between different

members of a given household. Nor is it easy to establish the appropriate minimum number of calories per person, as this will depend on the age, gender, and working activities of the individual.

• Food consumption as a fraction of total expenditure

Over a century ago, Ernst Engel observed in Germany that as household income per capita rises, spending on food rises too, but less quickly (The World Bank, 2011). As a result, the proportion of expenditure devoted to food falls as per capita income rises. One could use this finding, which is quite robust, to come up with a measure of well-being and hence a measure of poverty. For instance, households that devote more than (say) 60 percent of their expenditures to food might be considered to be poor. The main problem with this measure is that the share of spending going to food also depends on the proportion of young to old family members (more children indicates a higher proportion of spending on food), and on the relative price of food (if food is relatively expensive, the proportion of spending going to food will tend to be higher).

• Measures of outcomes rather than inputs

Food is an input, but nutritional status (being underweight, stunting or wasting) is an output. So, one could measure poverty by looking at malnutrition. Of course, this requires establishing a baseline anthropometric standard against which to judge whether someone is malnourished. This is a controversial issue; generally, less stunting (as measured by height for age) is found in Sub-Saharan Africa than in Southeast Asia although there is no reason to believe that the latter region is poorer than Africa (The World Bank, 2011). On the other hand, anthropometric indicators have the advantage that they can reveal living conditions within the household (rather than assigning the overall household consumption measure across all members of the household without really knowing how consumption expenditure is divided among household members).

• Peer or observer assessments

In many poor countries, very poor households are eligible for some subsidies, to cover health care and educational fees, for instance. The decision about who qualifies as being sufficiently poor is taken at the community level, where the local People typically know enough about individual households to make the determination

The main problem with such assessments is that, because they are based on perceptions formed on imperfect information, they may be biased. In addition to this, when one is looking at a community (province, region) rather than individual households, it might make sense to judge the poverty of the community by life expectancy, or the infant mortality rate, although these are not always measured very accurately.

School enrollments (a measure of investing in the future generation) represent another outcome that might indicate the relative well-being of the population. Certainly, none of these other measures of well-being are replacements for consumption per capita; nor does consumption per capita fully replace these measures. Rather, when taken together they allow us to get a more complete and multidimensional view of the well-being of a population, although this does not guarantee greater clarity.

In sum, there is no ideal measure of well-being: all measures of poverty are imperfect. That is not an argument for avoiding measuring poverty, but rather for approaching all measures of poverty with a degree of caution, and for asking in some detail about how the measures are constructed.

4.7 Summary Measures of the Extent of Poverty

Assuming that information is available on a welfare measure, such as income per capita, and on a poverty line, for each household or individual the extent of poverty can be measured by one of the following methods.

4.7.1. The Headcount Index (P_0):-

The head count index measures the proportion of the population that is **poor**. It is popular because it is easy to understand and measure. But it does not indicate how poor the poor are. The index is denoted by;

$$P_0 = \frac{N_p}{N}$$

Where, $\mathbf{N_p}$ is the number of poor and $\mathbf{N}$ is the total population (or sample). Then for example if 60 people are poor in a survey with a sample size of 300 people, then $\mathbf{P_0}$ = 60/300 = 0.2 = 20 percent are poor in head count.

4.7. 2. The Poverty Gap Index (P_1):-

The poverty gap index measures the extent to which individuals fall below the poverty line (the poverty gaps) as a proportion of the poverty line. The sum of these poverty gaps gives the minimum cost of eliminating poverty, if transfers were perfectly targeted. The measure does not reflect changes in inequality among the poor.

Thus, the poverty gap index, adds up the extent to which individuals on average fall below the poverty line, and expresses it as a percentage of the poverty line. More specifically, it defines the poverty gap (**Gi**) as the poverty line (**z**) less actual income (**yi**) for poor individuals and **I(·)** is an

indicator function that takes on a value of 1 if the bracketed expression is true, and 0 otherwise; the gap is considered to be zero for everyone else. Using the index function, we have

$$\mathbf{Gi = (z - yi) \times \mathit{I}(yi < z)}$$

Then the poverty gap index (P_1) may be written as;

$$P_1 = \frac{1}{N}\sum_{i=1}^{N}\frac{Gi}{z}$$

This measure is the mean proportionate poverty gap in the population (where the non-poor have zero poverty gap). The minimum cost of eliminating poverty using targeted transfers is simply the sum of all the poverty gaps in a population; every gap is filled up to the poverty line. However, this interpretation is only reasonable if the transfers could be made perfectly efficiently, for instance, with **lump sum transfers**, which is unlikely. Example, see table below.

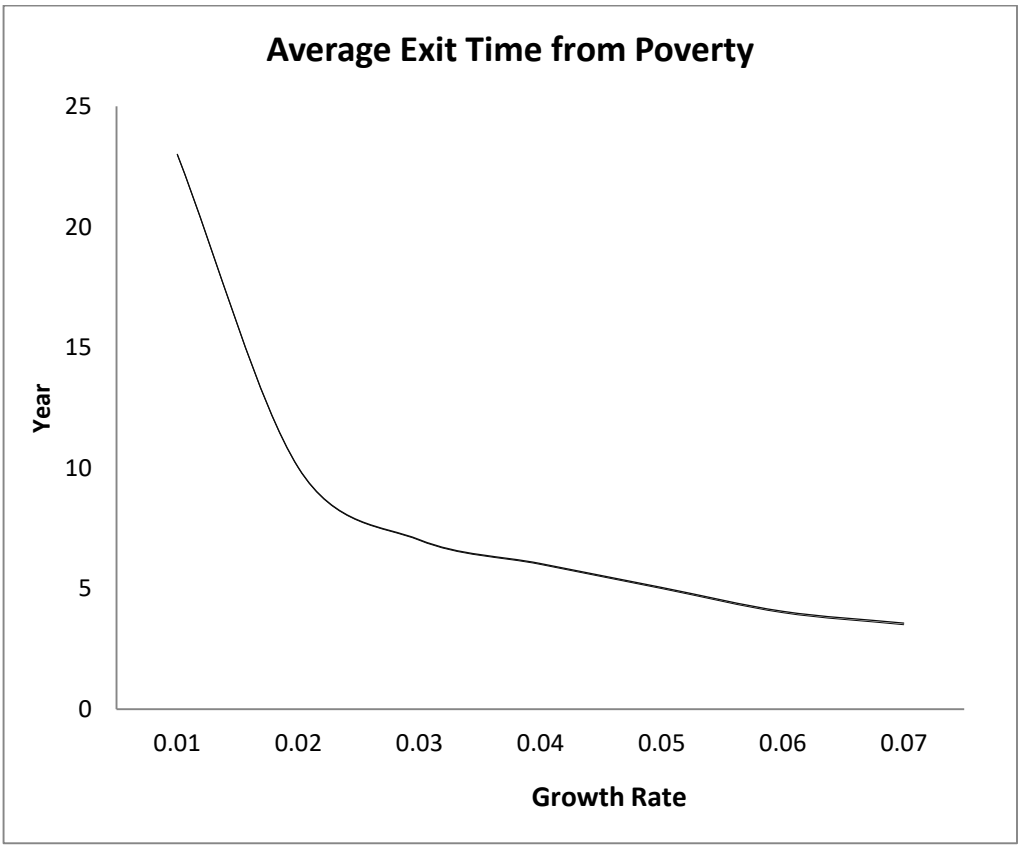
Calculating the Poverty Gap Index, Assuming Poverty Line of 125 for country X				
	Expenditure for each individual in country			
	100	**110**	**150**	**160**
Poverty gap	**25**	**15**	**0**	**0**
Gi /z	**0.20**	**0.12**	**0**	**0**
Poverty gap index (P_1)	**0.32/4 = 0.08**			

4.8 Time Taken to Exit Poverty

While dealing with poverty it is important to show how long it would take, at different potential economic growth rates, for the average poor person to exit poverty. According to data analyzed and presented by Morduch (1998) in (The World Bank, 2011) the average time it would take to

raise the consumption level of a poor person to the poverty line, depends on economic growth rates. It is assumed that this growth rate is continuous, in real terms, and is distributionally neutral among the poor.

If the economic growth rate, as shown on the figure below, enjoyed by the poor were only 1 percent per year, it would take over 20 years for the average poor person to exit poverty.



Source: (The World Bank, 2011)

But at a growth rate of 4 percent per year it would take less than six years for the average poor person to exit poverty. Hence, economic growth that acts to raise the real consumption levels of the poor can have a powerful effect on the elimination of poverty. Despite the potency of economic growth, it will generally take more than just growth to rapidly improve the lives of the very poor.

4.9 Inequality

Inequality is a broader concept than poverty in that it is defined over the entire population, not just for the portion of the population below a certain poverty line. Most inequality measures do **not** depend on the mean of the distribution; this property of mean independence is considered to be a desirable feature of an inequality measure. Of course, inequality measures are often calculated for distributions rather than expenditure - for instance, for income, land, assets, tax payments, and many other continuous and key variables.

4.9.1 Commonly Used Summary Measures of Inequality

There are a number of measures of inequality, but we will focus on two most common ones.

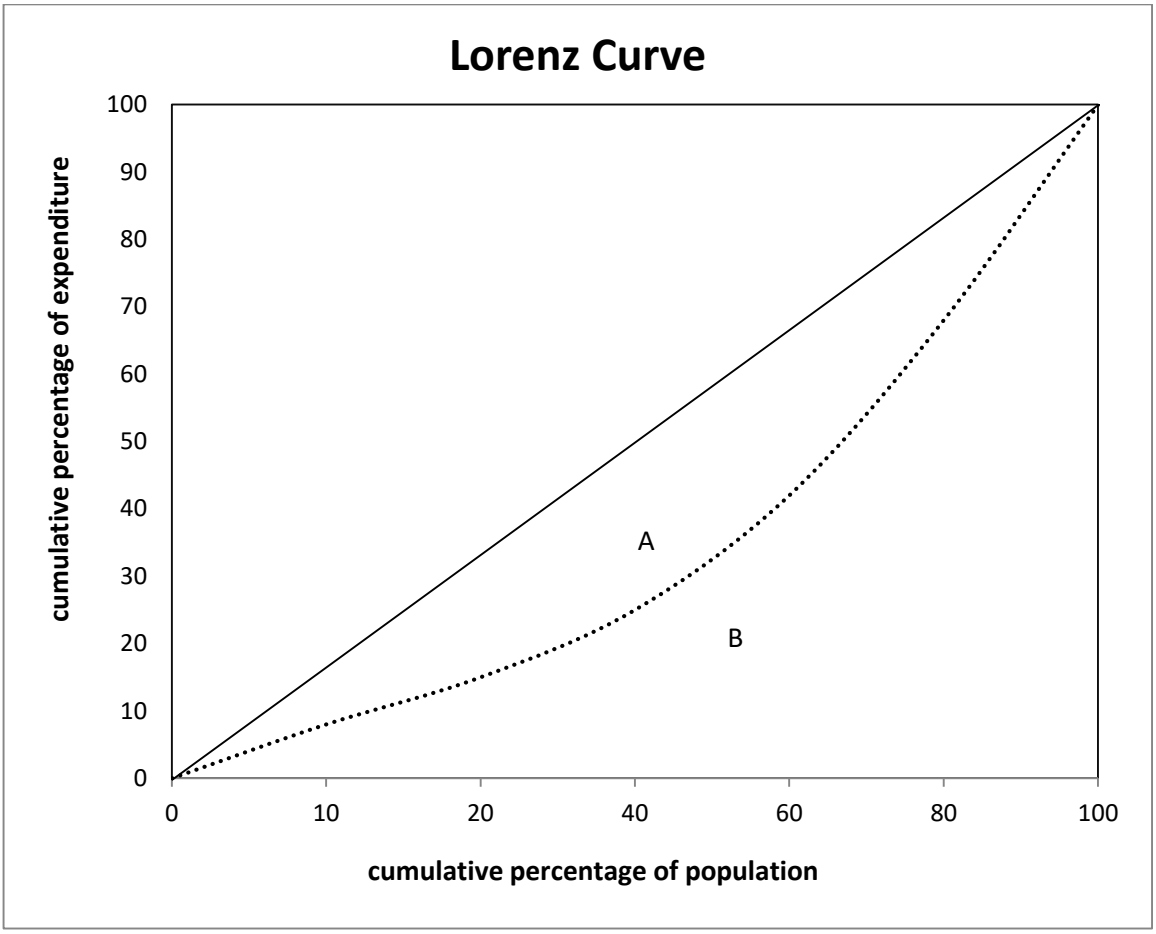
4.9.1.1 Decile Dispersion Ratio

A simple and popular measure of inequality is the decile dispersion ratio, which presents the ratio of the average consumption (or income) of the richest 10 percent of the population to the average consumption (or income) of the poorest 10 percent. This ratio can also be calculated for other percentiles (for instance, dividing the average consumption of the richest 5 percent, the 95^{th} percentile, by that of the poorest 5 percent, the 5^{th} percentile). The decile dispersion ratio is readily interpretable, by expressing the income of the top 10 percent (the "rich") as a multiple of that of those in the poorest decile (the "poor"). However, it ignores information about incomes in the middle of the income distribution, and does not even use information about the distribution of income within the top and bottom deciles.

4.9.1.2 Gini Coefficient of Inequality

The most widely used single measure of inequality is the Gini coefficient. It is based on the Lorenz curve, a cumulative frequency curve that compares the distribution of a specific variable

(for example, income) with the uniform distribution that represents equality. To construct the Gini coefficient, graph the cumulative percentage of households (from poor to rich) on the horizontal axis and the cumulative percentage of expenditure (or income) on the vertical axis as shown on the figure below. The diagonal line represents perfect equality.



Source: Authors' illustration

The Gini coefficient is defined as A/(A + B), where A and B are the areas shown in the figure. If A = 0, the Gini coefficient becomes 0, which means perfect equality, whereas if B = 0, the Gini coefficient becomes 1, which means complete inequality. Therefore, let x_i be a point on the *x*-axis, and y_i a point on the y-axis. Then

$$\text{Gini} = 1 - \sum_{i=1}^{N} (x_i - x_{i-1})(y_i - y_{i-1})$$

4.10 Poverty –Environment Linkages

Environment generally refers to a natural resource base that provides sources. The broad interpretations of both poverty and environment mean that understanding the linkages between the two as well as their relationship with population. Therefore, the following relationships can be outlined.

Poverty affects Population through:

- Limited access to water supply, fuel and labor-saving devices increases the need for children to help in fields and homes.
- Low asset base increases the need for children as insurance against illness and old age.
- Low level of education means less awareness of family planning methods, particularly for women.
- Low status of women means that they have limited power to control fertility.

Population affects Poverty through:

- Increasing landlessness - inherited plots divided and subdivided among many children.
- Overstretching available social services, schools, health centers family planning clinics, water and sanitation services.

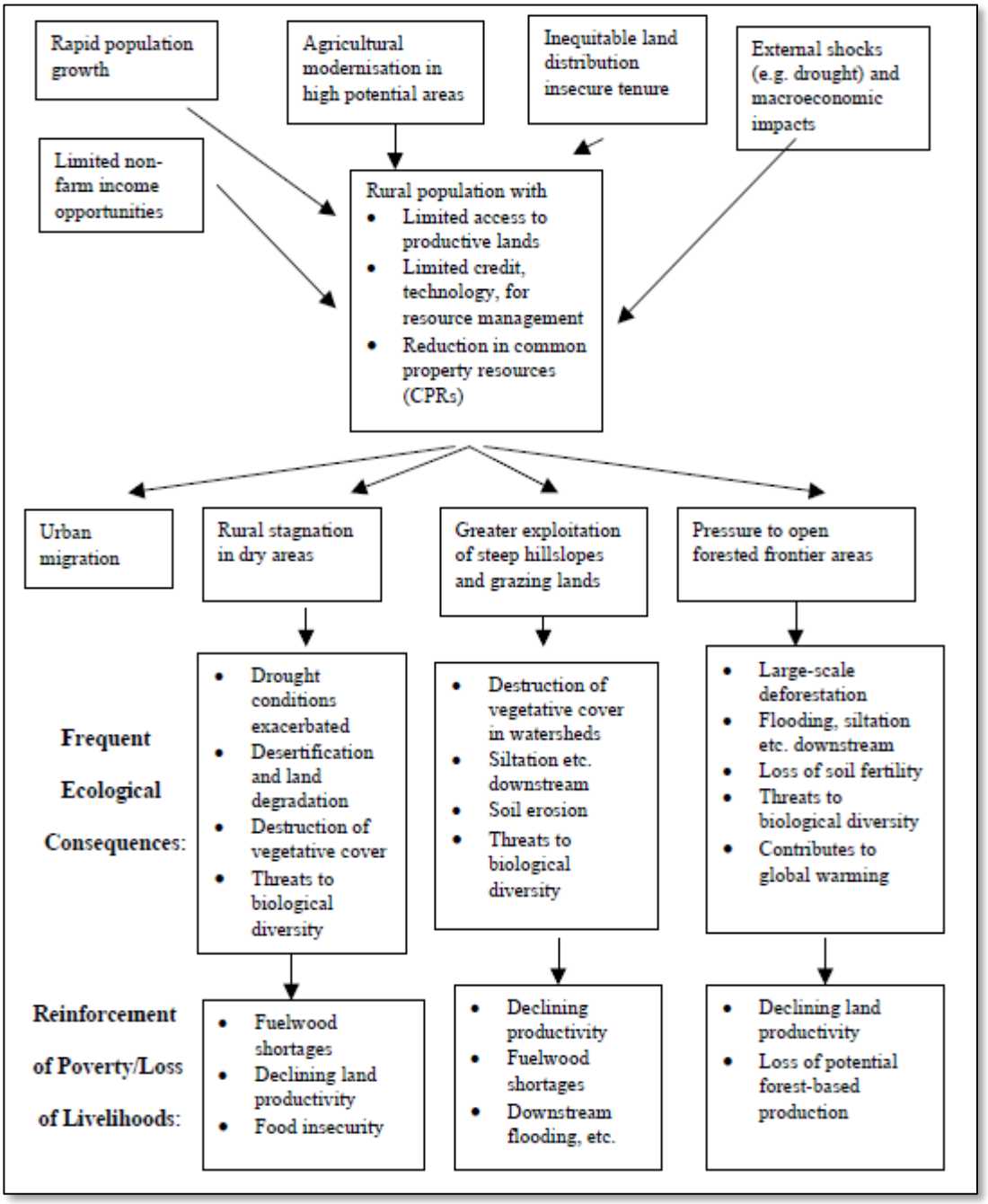
Population affects Environment through:

- Increasing pressure on marginal lands, over-exploitation of soils and forests, overgrazing.
- Soil erosion, silting, flooding.
- Migration to overcrowded slums, problems of water supply and sanitation, industrial waste dangers, indoor air pollution, mud slides.

Another hot issue in this aspect is the relationship that exists between poverty and environmental degradation. Poverty and environmental degradation are closely associated and causally

interlinked and should therefore be addressed together. The international goal of halving the number of people living in extreme poverty by 2015 (as manifested on Millennium Development Goal, MDG, 1 - Eradicate extreme hunger and poverty) (UNDP, 2011) and reversing environmental degradation will require addressing rural and urban poverty and environmental degradation simultaneously. The following figure shows this intricate relationship

Figure showing poverty-environment Links



Source: (OECD, 2002)

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