UNIT FIVE

MAJOR ECONOMIC AND ACTIVITIES OF AFRICA

5.1. OVERVIEW OF EMPLOYMENT STRUCTURE IN THE WORLD

Main Types of Economic Activities

- **Primary sector**: involves extracting raw materials, rearing animals, and growing crops.
- **Secondary sector:** involves changing of raw materials into new products (finished products). Hence, it is called 'manufacturing'.
- **Tertiary sector**: involves activities of people in the service sector, such as education, health, tourism, and banking.
- **Quaternary sector**: is based on knowledge. It includes activities such as information and communication technology (ICT), research & development, education, financial Planning, etc. It mostly engages people in information generating and sharing.

Different countries have different employment structures. Therefore, the employment structure of a given country can reflect many things about the country's economy. Such economic activities provide people with job opportunities. Then the people can purchase the goods and services they need through the earnings. Note that all countries of the world do not have the same share of these economic activities.

The percentage of each sector varies from one country to another depending on its level of development. Developed countries have more people who work in the tertiary sector, whereas, developing countries have more people engaged in the primary sector, particularly in agriculture.

Developing Countries (DVCs)

Developing countries (DVCs) are committed to agriculture. They have low level of literacy, high unemployment, rapid population growth and their exports are largely agricultural or raw materials. Capital equipment is scarce, production technologies are primitive, and productivity is low. More than 60% of the world's population lives in these nations, this can be divided into two groups.

a. The first group consists of middle-income countries. These are home to 75% of the world's population and 62% of the world's poor in 2020. They are further divided into two: lower middle-income and upper middle-income economies based on their gross national income (GNI).

• **Lower middle-income economies** - those with a GNI per capita between $1,036 and $4,045 in 2021.

• **Upper middle-income economies** - those with a GNI per capita between $4,046 and $12,535 in 2021.

b. The low-income countries are countries with GNI per capita of $1,025 or less in 2018.

Dominating this group in 2020 are **Afghanistan, Bangladesh, and the sub-Saharan African nations**.

Many DVCs such as China, Malaysia and Thailand have achieved high annual growth rates in their GDPs in recent decades and have moved out of low-income to lower middle-income. Meanwhile, previous DVCs, such as **South Korea, and Singapore** have achieved impressive success and became high-income countries.

5.2. MAJOR ECONOMIC ACTIVITIES IN AFRICA

Africa is home to about 1.3 billion people. Hence, it has large working age population. It is also a diverse continent offering human and natural resources which have the Potential to yield inclusive growth and eradicate poverty in the region. Therefore, Africa has very good opportunities for economic growth and development. At present time, Africa is composed of **low, lower-middle, upper-middle, and high income Countries.** However, Africa faces huge economic hurdles created largely by its **historical past**, widespread conflicts and bad economic policies pursued by its inexperienced leaders. Nevertheless, economic growth should focus on enabling Africans to live healthier and prosperous lives by harnessing the potential of its resources and people.

5.2.1. Economic Activities in Africa

i. Agriculture: Agriculture is by far the single most important economic activity in Africa. It provides employment for about two-thirds of the continent's working population and it contributes on average 30 to 60 percent of gross domestic product (GDP) and about 30 percent of the value of exports to each country. However, most agriculture in Africa is rain-fed and therefore very vulnerable to climate variability.

ii. Mining: Mining is one of the major economic activities in Africa. Africa has huge mineral resources. Therefore, due to Africa's mineral wealth and the global demand for mineral resources such as copper, gold, platinum, diamonds, etc. the mining sector actively operates in Africa.

iii. Forestry: Africa is rich in forests and woodlands. Africa has 624 million hectares under forests, which comprise **20.6 percent** of the continent's land area and **15.6 percent** of the world's forest cover. Forests and trees support many African national economies by supplying a variety of products and services to rural and urban communities. In addition, many wildlife and game parks are in forested areas.

iv. Fishery: Fish, fishing and fisheries are an integral part of the culture and economy of Africa. Fisheries play significant economic and nutritional roles in the continent. The sector contributes to food and nutrition security, and provides jobs, in particular for coastal populations, which are often among the poorest and most vulnerable.

Challenges of Primary Sector

Reliance on the extraction of basic natural resources or primary sector has the following challenges:

- Productivity and reliability in these industries vary because they depend on weather and natural elements (soil fertility and adequate rainfall.).
- Products of the natural environment are also dependent upon **exchange rates** and other industries to set their prices because the manufacturers have more economic power than the producer of raw materials.
- Primary sector workers often work for **extremely low wages.**
- Moving out of the primary sector into the secondary sector is the **hardest of all moves**, as governments may not have enough money for investment in the manufacturing sector.

B. Secondary Sector in Africa

The sector is made up of activities that process basic materials obtained by the primary sector, and turn them into new goods and products.

C. Tertiary Sector in Africa

The tertiary sector consists of a **range of service activities**. It involves the selling of services and skills. Meanwhile, selling goods and products from primary and secondary industries are also involved in the service sector. Services related to transport, storage, communication, and real estate have shown significant improvement in Africa in recent decades. The growth in the hospitality industry, represented by hotels and restaurants, indicates the growing importance of tourism in many African countries. Hence, tourism in Africa depends directly on the continent's natural resources and biodiversity base.

5.2.2 Major Factors Hindering Growth of Economy of Africa

Several factors hinder the growth of African economy.

1. Limitations in Technology

- ✓ Improvements in technological capacity are the key to development. It helps countries to create access and use Information Communications Technology (ICT) in solving socio-economic problems.
- ✓ In addition, innovation in science and technology is bringing significant changes in agriculture, medicine, and transportation among other sectors.
- ✓ Technological capability, therefore, brings the major difference between the developed and developing countries in the world.
- ✓ Hence, developed countries in Europe, North America and Asia have transformed their economies through the advancement of their technological capacities and improvement in human capital.
- ✓ African countries should invest in technology because limitation in technology capabilities is among the factors that hinder economic growth in Africa.

2. Over-dependence on Foreign Aids

In Africa, many countries highly depend on development partners to finance their development projects. Some sectors such as education, health and agriculture rely on foreign development partners to function. Over-relying on foreign aid leads to the stagnation of the economy of a country. Many African countries now have large percentages of their budgets financed by foreign donations.

The main problem such as dependence on aid is that instead of engaging in activities that facilitate economic growth, the countries wait for aids to enhance their education and infrastructure.

3. Poor Structures of the Economy

- ✓ Since most African countries could not adopt improved science and technology, they have not changed their economic structures since the time of independence.
- ✓ Therefore, they are still exporting raw materials that include cocoa, diamond, gold, bauxite, and gold in their raw forms.
- ✓ Thus, they do not **add value** to raw materials as a way of increasing their earnings in a global market. African countries still import products of light industries like toys, matches, and toothpicks among other products from other regions. This will in turn hinder its economic growth.
- ✓ Therefore, African countries should take the initiative to embrace technology in the manufacturing sector and establish better economic structures.

4. Poor Education

- ✓ Education is very important for the development of a country.
- ✓ Education promotes entrepreneurship by producing a skilled workforce. Countries get the knowledge and skills for manufacturing from quality education.
- ✓ However, the current education that the African countries are offering to students is yet to produce graduates that can take up the task of enhancing the African economy.
- ✓ African education system should, therefore, be changed to equip students with the information and skill that can help them to be competent in the global market activities.
- ✓ Generally, the poor status of the economy of Africa has led the continent to face high **unemployment**. The Africa has the world's highest rate of working poverty –people who are employed but earning less than **US$2 a day.**
- ✓ The exclusion of young people from the labor force causes generational cycles of poverty to continue and put countries into **vicious cycles of poverty**.

5.3 POSSIBLE SOLUTIONS TO THE PROBLEM OF UNEMPLOYMENT

I. Main Features of Unemployment

Employment is tied to wages or money that is paid regularly for doing work. If someone is employed, he/she has to be willing to work for the prevailing wage being offered to do the job. If someone is unemployed, he/she is unable to work or unwilling to do that same job.

There are two ways of being unemployed.

• **Voluntary unemployment** occurs when a person is jobless by choice .Quitting a job because someone has just started his/her own small business is one example of voluntary unemployment.

• **Involuntary unemployment** occurs when a person is willing and able to work for a given wage but cannot find a job. When university graduates could not get a job, as the economy fails to hire, is an example of involuntary unemployment. Unemployment is usually

Measured by the unemployment rate.

Unemployment is calculated by:

$$\frac{\text{the number of unemployed people}}{\text{The total number of people in the workforce}} \times 100$$

Unemployment rate serves as one of the indicators of a country's economic status.

II. Effects of Unemployment: It causes workers to suffer financial hardship. Then, it affects families, relationships, and communities. Unemployment rate serves as one of the indicators of a country's economic status.

Low level of consumption and buying power of citizens, in turn, causes lower profits for businesses. Finally, businesses may disappear and governments may reduce budget and workforce as they lose income from taxes.

III. Solutions for Unemployment

1. The Creation of more Job Opportunities: In order to satisfy the needs of its people, all countries should ensure that they create many job opportunities so that the people, who are eager to work, get the chance to do so.

2. Individuals should be Encouraged to Enter Diverse Fields:

Most often, our parents encouraged us to become either a doctor or pilot. Everyone cannot be a doctor or pilot. Therefore, from a very young age, kids should be encouraged to broaden their choices and horizons. As they grow up, they can be innovative in different fields and the economy of the country becomes more diverse.

3. Sustainable Development:

- The concept of sustainable development was described by the **Brundtland Commission Report (1987**) as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs."
- There are four dimensions to sustainable development – **society**, **environment**, **Culture,** and **economy** – which are intertwined, not separate.
- Sustainability is a paradigm for thinking about the future in which environmental, societal, and economic considerations are balanced in the pursuit of improved quality of life.
- Sustainable development integrates many processes and pathways to achieve it (e.g., sustainable agriculture and forestry, sustainable production and consumption, good governance, research and technology transfer, education, and training, etc.).
- Therefore, sustainable development leads to sustainable employment.

5.4 AFRICA'S AGENDA 2063 AND ITS IMPLICATIONS

Africa has multiple socio-economic problems that need urgent solutions. To that end, African leaders have launched Agenda 2063. It is Africa's blueprint and master plan for transforming Africa into the global powerhouse of the future. It is the continent's strategic framework that aims to deliver on its goal for inclusive and sustainable development and is a concrete manifestation of the pan-African drive for **unity**, **self-determination**, **freedom**, **progress,** and **collective prosperity** pursued under Pan Africanism and African Renaissance.

The main aim of Agenda 2063 was to refocus and reprioritize Africa's agenda from the struggle against apartheid and the attainment of political independence for the continent (which had been the focus of the Organization of African Unity (OAU), the predecessor of the African Union (AU) and instead to prioritize on:

- ✓ *inclusive social and economic development;*
- ✓ *continental and regional integration;*
- ✓ *democratic governance; and*
- ✓ *peace and security.*

Agenda 2063 is the concrete manifestation of how the continent intends to achieve this vision within a 50 year from 2013 to 2063.

The need to envision a long-term, 50-year, development plan for Africa is important as Africa needs to revise and adapt its development agenda – mainly for the following initiatives:

- renewed economic growth and social progress;
- the need for people - centered development;
- gender equality and youth empowerment; and
- Changing global contexts such as increased globalization and the ICT revolution.

Agenda 2063 - Flagship Programs

1 Integrated high-speed train network
2 Formulation of an African commodities Strategy
3 Establishment of the African continental free trade area
4 The African passport and free movement of people
5 Silencing the guns by 2020
6 Implementation of the Grand Inga Dam project
7 Establishment of a single African air transport market
8 Establishment of an annual African economic forum
9 Establishment of the African financial institutions
10 The pan-African e-network
11 Africa outer space strategy
12 An African virtual and E-university
13 Cyber securities
14 Great African Museum
15 Encyclopedias

5.5 AFRICA'S AGENDA 2063 VIS-À-VIS SUSTAINABLE DEVELOPMENT GOALS

The Sustainable Development Goals (SDG) or Global Goals are a collection of 17 interlinked global goals designed to be a **"*blueprint to achieve a better and more sustainable future for all*".** These goals provide a shared blueprint for **peace** and **prosperity** for people and the planet, now and into the future. SDGs recognize that ending poverty and other deprivations must go together with strategies that improve health and education, reduce inequality, and spur economic growth – all while tackling climate change and working to preserve our oceans and forests.

The SDGs were set up in 2015 by the United Nations General Assembly and are intended to be achieved by the year 2030. They are included in a UN Resolution called the Agenda 2030 or what is simply known as Agenda 2030. The SDGs were developed in the Post-2015 Development Agenda as the future global development framework to succeed the Millennium Development Goals (MDG) which ended in 2015.

Sustainable Development Goals

Goal 1: No poverty Goal
Goal 2 : Zero hunger
Goal 3: Good health and well-being
Goal 4: Quality education
Goal 6: Clean water and sanitation
Goal 7: Affordable and clean energy.
Goal 8: Decent work and economic growth
Goal 9: Industry, innovation, and infrastructure
Goal 10:Reduced inequalities
Goal 11: Sustainable cities
Goal 12: Responsible Consumption and production
Goal 13: Climate action
Goal 14: Life below water
Goal 15: Life on land
Goal 16: Peace, justice, and strong institutions
Goal 17: Partnerships For: the goals

5.6 LINGUISTIC AND RELIGIOUS DIVERSITY IN AFRICA

5.6.1 Language Diversity in Africa

Africa has a long history of human habitation; hence, it is home to numerous cultural and linguistic groups. The African continent is home to one-third of the world's 6,000 languages, but less than one seventh of the world's population. Hence, Africa is the most linguistically diverse continent. There are more than 2000 living languages in Africa. A living language is simply a language that is still spoken in the current time. It is sometimes referred to as a modern language and is currently in use. A living language must have at least one speaker whose first language is the language in question.

The list below shows in just 22 countries about 2,086 languages are spoken in Africa.
Nigeria 514 , Cameroon 278, . Democratic Republic of Congo 215. Chad 131, Tanzania 128, Ethiopia 86, Ghana 79, Côte d'Ivoire 78, Central African Republic 71, Kenya 69 Burkina Faso 68, Mali 57, Benin 54 ,Gabon 42 ,Togo 39, Liberia 30, Botswana 29, Guinea-Bissau 21, Equatorial Guinea 14, South Africa 11,Gambia 10.

5.6.2 Religious Diversities in Africa

The major religions of the world (**Hinduism, Buddhism, Islam, Confucianism, Christianity, Taoism, and Judaism**) differ in many respects, including how each religion is organized and the belief system each upholds. Other differences include the nature of belief in a **supernatural power**, the history of how the **world and the Religion began**, and the use of **sacred texts and objects**. Therefore, there is a very diverse religious system in the world.

Africa is home to many religions and beliefs. It contains a mixture of both local beliefs and global beliefs. Although religion in Africa is multifaceted, it has largely influenced the art, philosophy, and culture of the continent. In today's Africa, various individuals adhere to mostly **Christianity**, **Islam**, and **traditional** African beliefs (folk religions). Many African countries have high scores of religious diversity index (RDI). Many African countries have high scores of religious diversity index (RDI). The RDI calculates scores for countries, based on the shares of eight major world religions(**Christians**, **Muslims**, **Buddhists**, **folk religions**, **Hindus**, **Jews**, **other religions** considered as a group, and the **religiously unaffiliated**). The index is on a scale from 0 -10, with 10 being the maximum possible diversity if each of the eight groups constitutes an equal share of the population. The RDI is divided into four ranges: **very high** (scores 7.0 and higher), **high** (scores from 5.3 to 6.9), **moderate** (scores from 3.1 to 5.2) and **low** (scores from 0 to 3.0). This score estimates the number of people in a country who view themselves as belonging to one religious group.

Therefore, in Africa Guinea Bissau and Togo with RDI 7.5 each and Ivory Coast (7.4), Benin (7.2) and Mozambique (7.0) are high religious diverse countries. However, religious diversity is not only limited to Africa. It is also common in the whole world. Some countries host one or two religions. While others have many religions fairly well distributed in their territories and coexist peacefully

UNIT SIX

HUMAN – NATURAL ENVIRONMENT INTERACTIONS

6.1 OVER VIEW OF GLOBAL POPULATION CHANGE

Population change is the difference in the size of the population from the beginning to the end of a certain period. The change in the population also changes the composition of the population because of **birth** and **death** rates, **sex ratios**, **life expectancies** and **migration** rates Mean while, population growth is the increase in the number of individuals in a population. The two factors involved in the increase in the number of individuals in a population are **fertility** (birth**)** and **immigration**(in migration**)**. On the other hand, mortality (death) and emigration (out migration) decrease the number of individuals in a population. Understanding these changes at different spatial scales (local, national, regional and global scales) is very important for development planning.

Table6.1:Continents by Population

Rank	Continent	Population		Share (%)	Growth(2021)	
		2020	2021		Net Change	Rate(%)
1	Asia	4,641,054,786	4,679,660,580	59.54	38,605,794	0.83
2	Africa	1,340,598,113	1373486472	17.20	32,888,359	2.45
3	Europe	747,636,045	747,747,396	9.59	111,351	0.01
4	North America	592,072,204	596,591,192	7.60	4,518,988	0.76
5	South America	430,759,772	434,260,138	5.53	3,500,366	0.81
6	Oceania	42,677,809	43,219,954	0.55	542,145	1.27
		7,794,798,729	7,874,965,732		80,167,003	

6.2 HUMAN-ENVIRONMENT RELATIONSHIP

Environment is defined as the surroundings or conditions in which persons, animals, or plants live or operate. It refers to all of the external factors affecting an organism. Therefore, environment is a multidimensional system of complex relationships in a continuing state of change.

Why do humans interact with the environment?

The objective of human interaction with the environment is to satisfy human being's increasing **needs**. In order to satisfy the needs, the relationship that exists between human beings and the environment is a two-way or **reciprocal** direction. That is, human beings and the environment affect each other. However, the role of humans in the interaction, especially how humans affect the environment, was understood differently at different times. Therefore, different theories were put forward to explain the role of human beings in human environment interaction. The two most popular theories are – **environmental determinism** and **environmental possibilism**.

1. **Environmental determinism**: is the idea that the natural or physical environment shapes and creates cultures; in other words, the environment essentially **dictates** culture. It is the doctrine that asserts economic growth and other activities of human beings are controlled by the **physical environment**..
2. **Environmental possibilism:** is the theory that asserts people can adapt to diverse environmental conditions and choose from many alternatives (possibilities), despite the **limitations** that the environment poses. Possibilism is the opposite of environmental determinism. Possibilism is a doctrine which claims that human beings have the capacity to choose between a range of possible responses to physical conditioning (environment). Therefore, the degree of influence of the natural environment declines with increasing **modernization** and **technological** advancement.

Human environment relationship refers to the interaction human beings have with their environment. Human beings cannot survive without some form of interaction with the environment. Interaction is understood in the ways people adapt and modify the environment. There are three types of human environment interaction. These are: dependence, modification, and adaptation to the environment Dependence on the Environment Every living thing on the Earth depends on the environment. The dependence is basically to obtain the essential resources for survival. Therefore, human beings depend on the environment such as ***air, water, food or shelter they obtain from the environment*** Moreover, the natural environment plays an important role in supporting **economic activities**. Its contributions include:

- **directly** by providing resources and raw materials such as water, timber and minerals that are required as input for the production of goods and services; and
- **indirectly** through services provided by ecosystems including carbon sequestration, water purification, managing flood risks and nutrient cycling. Therefore, the environment is vital for securing economic growth and development by providing natural resources. The provision is not just for present generations but also for future generations. As a result of this, human beings extremely dependent on the environment. Modification of the Environment Humans modify their environment **negatively** or **positively**. The main purpose of the modification is to fulfill their needs. The modification allows them to extract and utilize natural resources. Some of these modifications include:
  - Cutting down the forests to increase agricultural land and grow more crops
  - Construction of dams to store water for hydroelectricity , irrigation and avoiding floods
  - Drilling of the holes in the ground to extract oil or other natural resources

  Human activities lead to the modification of the environment. Specially,

1. As the number of people in a country or region increases,
2. More food is needed to feed the people. This in turn forces people to utilize more natural resources for survival.

The cause impacts on the environment in such ways as over population, pollution cause impacts on the environment in such ways as over population, pollution, burning fossil fuels, and deforestation. Changes like these have triggered **climate change**, soil erosion, poor air quality, and undrinkable water. On the contrary, the environment also casts a negative impact on the lives of people. Natural calamities like floods, drought, wildfires, earthquakes, and tsunamis are a few examples of nature's negative impacts. Consequently, these negative impacts on the environment can cause large scale migrations and death of people.

Positive effects of humans on the environment.

1. afforestation and conservation ,
2. Humans can contribute to better air quality and make efforts to reduce the levels of carbon dioxide in the atmosphere as well as protect endangered species.

6.2.3 Adaptation to the Environment

Adaptation refers to an adjustment to a new environment so as to improve the chances of survival in that environment. (for example, increasing temperature, flooding, etc.). Adaptation makes people get prepared for the following actions:

A. Reducing vulnerability (e.g., to climate change),
B. Identifying the most vulnerable people,
C. Building adaptive capacity,
D. Reducing exposure or sensitivity to impacts, and
E. Ensuring sustainable developed The adaptation process

It requires the engagement of a wide range of stakeholders. The stakeholders are

A. governmental
B. Nongovernmental organizations.
C. It also requires analysis of **current** exposure to different **shocks** and **stresses**,
D. Analysis of future impacts of **environmental changes** (e.g. Climate change, deforestation, desertification, etc.).
E. It demands an understanding of the existing vulnerability of individuals, households and communities.
F. **Adaptation strategies** should be designed and implemented.
G. **Monitoring** and **evaluation** of the effectiveness of activities planned.
H. Finally, sharing knowledge and lessons learnt are the last part of the adaptation process.

Well-planned adaptation strategies result in **adaptation responses**,

- **Adaptation responses can be grouped into the following broad categories:**
  1. Technological solutions – grey measures;
  2. Ecosystem based adaptation options – green measures; and
  3. Behavioral, managerial and policy approaches – soft measures.

Green and **soft** measures aim at decreasing the sensitivity and increasing the adaptive capacity (adjust to the changes or using it as an opportunity and creating new mechanisms) of human and natural systems, hence, building resilience. They often provide low-cost solutions. There are also high-tech and innovative technological solutions which often need a large amount of funding and require more research, experience and training to be operated. Meanwhile, green measures result in nature based solutions and ecosystem services to environmental problems. For instance, reforestation can stop desertification and recharge groundwater supplies in times of drought.

Types of Adaptations to Environmental Changes

1. Autonomous adaptation: It is an adaptation that does not constitute a conscious response to environmental change but is triggered by ecological changes in natural systems and by market or changes in ways of living in human systems. It is also referred to as **spontaneous adaptation**.

2. Planned Adaptation: It is an adaptation that is the result of a deliberate policy decision, based on an awareness that conditions have changed or are about to change and that action is required to return to, maintain, or achieve the desired state.

Can humans modify every environment?

There are some environmental conditions, which humans cannot modify. Hence, the adapt to such conditions for their survival. Some examples of such environmental conditions in which human beings make adaptations include: *taking benefit of the natural slope of the land for irrigation;*

- building houses on higher ground to avoid flood;
- wearing thin clothes to survive in hot climates; and
- wearing warm clothes to survive in cold climate.

6.3 INDIGENOUS KNOWLEDGE IN CONSERVATION OF NATURAL RESOURCES IN AFRICA

The African people have an enormous amount of knowledge about biodiversity and its uses. Such indigenous knowledge has been accumulated among indigenous peoples of the continent and has been orally transferred across many generations. Indigenous knowledge has been the basis for conservation of natural resources in Africa. Therefore, indigenous knowledge is valuable in managing environmental degradation and in the sustainable use of natural resources.

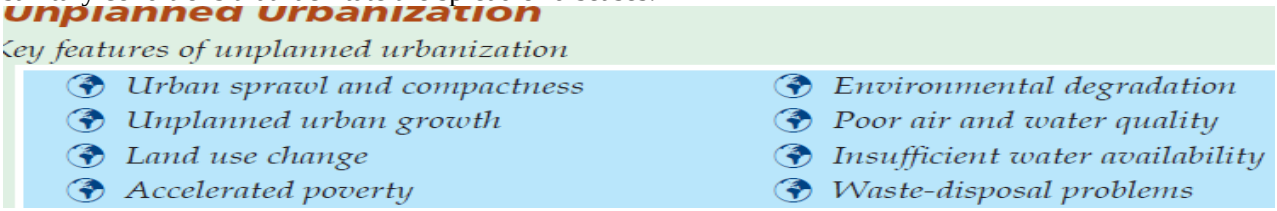
UNIT SEVEN
GEOGRAPHIC ISSUES AND PUBLIC CONCERNS IN AFRICA

7.1 UNPLANNED URBANIZATION

Urbanization refers to the population shift from rural to urban areas. It is predominantly the process by which **towns** and **cities** are formed and become larger as more people begin living and working in them. As cities grow in population size, spatial extent and density, their environmental and ecological footprints increase.

Urban expansion that takes place in forests, wetlands and agricultural systems leads to habitat clearing, degradation and fragmentation of the landscapes. Urban lifestyles, which tend to be consumptive, requiring great natural resources and generating increasing amounts of waste also lead to increased levels of air, water and soil pollution. Therefore, unplanned urbanization is the root cause of damage to the environment and nature.

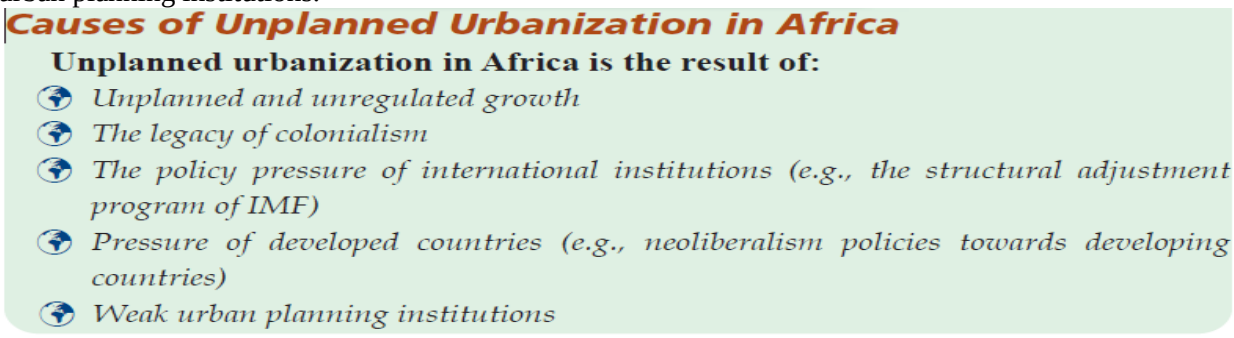
Unplanned urban expansion creates big slums, exacerbating socio-economic disparities and creates unhealthy or poor sanitary conditions that facilitate the spread of diseases.



7.1.1 Causes of Unplanned Urbanization in Africa

Though Africa is still largely rural, it is one of the fastest urbanizing continents in the world. Africa's urban population is expected to reach 2.5 billion in 2050. This accounts for 21% of the world's projected urban population. Currently, the continent has **seven megacities**, that is cities with populations over 10 million: Cairo, Kinshasa, Lagos, Accra, Johannesburg–Pretoria, Khartoum, and Nairobi.

Despite high rates of urban population growth, many African countries still have high degree of **urban primacy**. That is, one city - usually the capital, has the population, economic activity, and political power that are several times greater than the next largest city. Much of urban expansion in Africa is characterized by unplanned and unregulated growth, exacerbated by the **legacy of colonialism**, structural adjustment program, and effects of neoliberalism that spawned weak urban planning institutions.



7.1.2 Consequences of Unplanned Urbanization

Some of the consequences of unplanned urbanization are discussed as follows:

1. Development of Slums and Squatter Settlement

When urbanization takes place as a result of a random and unexpected growth it leads to the spread of unlawful residential settlements represented by **slums** and **squatters**. The growth of slums and squatters in urban areas is even further exacerbated by fast-paced industrialization, lack of developed land for housing, large influx of rural immigrants to the cities in search of better life, and very high prices of land beyond the capability of the urban poor.

2. Poor Infrastructure

The quality of city's infrastructure is central to the residents' quality of life, social inclusion and economic opportunities. The availability and quality of infrastructure are at the core of many of the challenges faced by rapidly urbanizing cities in African countries. As cities expand rapidly, the rate at which infrastructure growth does not keep pace with the growth or the increased demands of populations. Therefore, action is urgently needed to close the infrastructure gap and reduce the potential risks that have negative effects.

Characteristics of Urban Infrastructure in Africa

Urban infrastructure in Africa is characterized by the following features:

- Infrastructure investments in urban areas in most African countries are insufficient to maintain the quality of infrastructure.
- Transportation infrastructure (roads, railroads, airports, and ports) is very weak.
- Electric power supply and distribution are inadequate.
- Water supply and sewage are in serious shortage.
- Communications infrastructure is very weak.

3. Economic Problem

Residents in many urban centers in Africa face huge economic problems. The costs of housing, food and transportation is very high in the urban centers. In addition, in urban areas, unemployment rates are high and about 60 percent of jobs are in the informal or grey economy which are neither taxed nor monitored by the government.

4. Health Problem

Urbanization creates opportunities but also exacerbates health risks, (e.g., obesity, respiratory diseases, etc.). Moreover, large proportion of urban dwellers in Africa lack adequate sanitation and are exposed to high health risks.

5. Social Instability

Rapid and unplanned urbanization can also quickly lead to urban violence and social unrest. This could be because of widening inequalities largely observed in urban than rural areas. The combination of inequality, competition for scarce resources such as land, violation of law and weak city governance increase the risk of violence and potential breakdowns in law and order.

Climate Change and Unplanned Urbanization in Africa

Climate change poses serious problems on urban centers in Africa.

The migration of large number of people from rural areas to cities is at least partially driven by the increasing prevalence of extreme weather. Moreover, cities located near the sea or natural waterways, are at more risk of flooding. Therefore, making cities more resilient to extreme weather events should be a priority for both local governments and the private sectors in African countries.

Unplanned Urbanization in Africa: the case of Addis Ababa city

Addis Ababa, Ethiopia's largest city, is a fast-growing city that is overwhelmed by many problems, including unplanned urban development and inefficient land uses, extensive urban poverty, joblessness, inadequate housing, congestion and underdeveloped infrastructure. Historically, Addis Ababa was established from villages that evolved into major urban settlement without master plan. Informal settlement is at the heart of the genesis and development of the city of Addis Ababa. The settlements lack basic municipal services such as water, sanitation, waste collection facilities that remain to be the hallmarks of such settlements.

Unplanned and informal settlements in Addis Ababa are of two types. **The first** one is commonly known as the slums which are located in the highly congested areas marked by deteriorated infrastructure and unsanitary environment.

The second type of unplanned urban settlement is the squatter settlement which denotes the settlements illegally built due to urbanization in an open space, farmland, steep slope, along river buffer and road sides without legal title deed particularly in the urban periphery. Such settlements in Addis Ababa city are characterized by low quality housing, occupied by the poor.

7.2. MIGRATION – FACTORS AND IMPACTS ON AFRICA

Human migration is the permanent change of residence by an individual or group of people.

Migration falls into several broad categories.

1. **Internal and international migration:**
2. **voluntary or forced.**

The causes of migration are multitude since a complex web of factors underlie the process. There are **push** and **pull** factors of migration. In Africa multiple push factors spur migration both within the continent and to other regions. Some of the push factors are economic in nature, like; poor socio-economic conditions, low wages, high levels of unemployment, and poverty.

In addition to economic factors, various political and social factors create fertile grounds for migration.

Among these, poor governance, corruption, political instability, conflict and civil strife are major causes of migration for both skilled and unskilled workers.

7.3 COASTAL POLLUTION IN AFRICA

The major of pollutants that make their way into the ocean caused by human activities along the coastlines and far inland. Pollution of coastal waters may arise from various sources, such as: the discharge of sewage and industrial waste from coastal channels, the dumping of wastes at sea, the discharge of sewage and rubbish from ships, the handling of cargo, the exploration and exploitation of the sea bed and ocean floor, accidental pollution by oil spills, and other substance of pollutants from the land by air and other routes. Undoubtedly the most frequent cause of coastal pollution problems is the **discharge of municipal sewage and industrial wastes** into coastal waters or into estuaries through low quality disposal facilities. Many factors such as dilution, temperature, adsorption, sedimentation and nutrient deficiencies negatively affect self-purification of the sea. The marine environment is generally unfavorable to the survival of most pathogenic organisms.

Coastal pollution is rising rapidly as a result of population growth, urbanization, and industrial development along many coastal areas of Africa.

UNIT EIGHT

8. GEOSPATIAL INFORMATION AND DATA PROCESSING

8.1 BASIC CONCEPTS OF GEOSPATIAL INFORMATION

8.1.1 The Similarity and Difference between Information and Data

Although *data* and *information* are often used interchangeably, they are not the same. They both have specific meanings.

I. Data: refer to different observations which are collected and stored as numbers, characters, images, facts and symbols. They describe a feature, idea, status, or situation that we want to focus on or are interested in. Therefore, data are sets of values of qualitative or quantitative variables about one or more persons or objects. Data has important lifecycles. **It begins with data collection. At this stage ,we may collect new data** (primary data) from a study area or existing secondary data obtained from different offices (e.g., Central Statistical Agency). **The second stage in the data Life cycle is data processing.** This stage involves checking for data quality such as quality assurance (QA) and quality control (QC), merging duplicate variables, and appending new information into the data. **The third stage involves the analysis of data**. Here different statistical analyses can be used to identify meaningful relationships between or amongst variables, and then the results can be displayed in tables, charts ,and graphs for visualization.

The final stage is the dissemination of results. This stage involves sharing results with the general public through conferences, workshops, and publishing the results in known journals ,and archiving the results so that they can be accessible for future use.

II. Information: is the result of processing, manipulating, and organizing data in a way that adds to the knowledge of a receiver. In other words, it is the context, in which data is taken.

Table 8.1: Some Differences between Data and Information

Data	Information
▪ Data is used as an input for the computer system. ▪ Data is unprocessed facts or figures. ▪ Data does not depend on information.	▪ Information is an output of data. ▪ Information is processed data ▪ Information depends on data

8.1.2 Basic Concepts of Geospatial Data

Geospatial data: is data about objects, events or phenomena that have **location** information of the surface of the earth they represent. Geospatial data typically combines **location information** (usually coordinates on the earth) and **attribute information** (the characteristics of the object, event or phenomena concerned) with **temporal information** (the time at which the location and attributes existed). Geographical data links **place**, **time**, and **attributes**. Geographical data is at the heart of map making. Without geographical data events or phenomena of an area of our interest (AOI) cannot be visualized and analyzed.

A. Place

Place or location is essential in the collection of geographical data. Locations are the basis for mapping an area of our interest. Based on the location we can link different kinds of information to it, and measure distances and areas. Without locations, data are said to be "**aspatial**" or non-spatial, and have no value at all.

B. Time

Time is an optional element. Many aspects of the earth's surface are slow to change and can be thought of as unchanging. For example, height above sea level changes slowly because of erosion and movements of the earth's crust, but these processes operate on scales of hundreds or thousands of years and for most applications (except geophysics) we can safely omit time from the representation of elevation. On the other hand, temperature changes daily and dramatic changes sometimes occur in minutes with the passage of a cold front or thunderstorm, so time is very important.

C. Attributes

Attributes refer to descriptive information about the objects, events or phenomena that we try to map. There is a lot of attribute information an area may have. Some attributes are **physical** or **environmental** (e.g., temperature or elevation), while others are **social** or **economic** (e.g., number of populations, or income).

8.1.3 Visualizing Geographic Data

There are two fundamental ways of visualizing geographic data. It can be visualized as a discrete object or as continuous data.

A. Discrete objects represent an area as objects with well-defined boundaries in open space. Hence, a **discrete object** has known and definable boundaries. It is easy to define precisely where the object begins and where it ends. For example, a lake is a discrete object within the surrounding landscape.

B. Continuous data represents areas or phenomena that progressively vary across a surface or a location. The values of a measure of variables may vary from point to point. Continuous data is also referred to as field, non-discrete, or surface data. An example of continuous data is elevation. The starting point being sea level, the elevation of an area varies across the surface.

8.2 SOURCES AND TOOLS OF GEOGRAPHIC DATA

8.2.1 Sources of Geographic Data Geographic data are collected from a variety of sources and in different formats. The data can be collected using instruments that measure natural phenomena (e.g. temperature, rainfall, humidity, etc.) as well as by advanced satellites (e.g., remote sensing). Therefore, geographic data come from two important sources:

a) Directly Collected

b) Remotely Sensed

A. Directly collected data are generated at the source of the phenomena being measured. Examples of directly collected data include measurements such as temperature readings at specific weather stations and elevations recorded by visiting the location of interest. Data can also be obtained through surveys (e.g., the census and sample surveys) or observation (e.g., counting the number of trees in a farmland).

B. Remotely sensed data are measured from remote distances without any direct contact with the phenomena or a need to visit the locations of interest. Satellite images are examples of remotely sensed data.

Sources of Geographic Data

The most common general sources for geographic data are:

- hard copy maps (analogue maps);
- aerial photographs;
- remotely-sensed imagery;
- point data samples from surveys;
- existing digital data files.

8.2.2 Tools for Geographic Data Collection

Data collection is the process of gathering and measuring information on variables of our interest. It is usually carried out systematically so that it enables us to appropriately map the area of our interest. Therefore, the first step in making a map is to complete a **field survey**. Surveyors observe, measure, and record what they see in the specific area.

There are different types of tools or hardware that help us in data collection.
The tools include: **global positioning system** (GPS) and **digitizers**.

I. Global Positioning System (GPS): A global positioning system is a satellite network that is used to determine the exact location of a place. GPS receivers are widely used in cars and smartphones to provide directions to specific locations. The GPS receiver is very valuable for documenting information about a place. It provides latitudinal and longitudinal coordinate values of an area and the elevation value of the area.

II. Digitizers: is a tool used to change images on analogue form or paper into a digital form on a computer. Therefore, digitization is the process of converting information into a digital (i.e. computer-readable) format. Instruments that are used in digitation include: table digitizer, scanner and smartphones. Data generated by digitizer provides geo referenced information of an area. Whereas images generated by scanners and smartphones should be geo-referenced. Geo referencing means that the internal coordinate system of a map or aerial photo image can be related to a geographic coordinate system of an area being scanned.

8.3 GEOGRAPHIC DATA REPRESENTATIONS

Involves graphical visualization of the data or producing map of an area. Maps are used in order to gain better insight and understanding of the area of our interest. There are two main forms of geographic data representations. These are **hardcopy also known as analogue format and digital format**.

The digital representation of geographical data has enormous advantages over paper maps. It can be used in digital devices such as personal computer (PC), and information providers such as the internet, or mass storage devices for many purposes.

A map is composed of different geographic features represented either as **points**, **lines** and areas. Each feature is defined both by its location in space (with reference to a coordinate system), and by its characteristics

(typically referred to as **attributes**). Therefore, map is a model of the real world where all geographic features on the earth's surface can be characterized and defined as one of the three basic features – point, line or area.

i. Point data exists when a feature is associated with a single location in space.nExamples of point features include a telephone network tower, water well and a weather station.

ii. Line data exists when a feature's location is described by a string of spatial coordinates. Examples of linear data include rivers, roads, pipelines, etc.

iii. Area data exists when a feature is described by a closed string of spatial coordinates. An area feature is commonly referred to as a polygon. Examples of polygonal data include forest stands, soil classification areas, administrative boundaries, and climate zones. Most polygon data are considered to be homogeneous, and thus they are consistent. Meanwhile, in the digital format, the same geographic features outlined above are stored and displayed in three basic types of spatial data models.

Vector, Raster and Image.

1. Vector Data Models: Vector storage implies the use of vectors (directional lines) to represent a geographic feature. Vector data is characterized by the use of sequential points or vertices to define a linear segment. Each vertex consists of an X coordinate and a Y coordinate or latitudinal and longitudinal values. Hence, **point** feature is defined by one coordinate pair of X and Y. Vector lines are also referred to as ***arcs*** and consist of a string of vertices terminated by a ***node***. A node is defined as a vertex that starts or ends an arc segment. **Polygonal** (area) features are defined by a set of closed coordinate pairs.

2. Raster data models: Raster data models incorporate the use of *a grid-cell* data structure where the geographic area is divided into *cells* identified by row and column. This data structure is commonly called a raster. The size of cells in a tessellated (characterized by a pattern of repeated shapes, especially polygons, that fit together closely without gaps or overlaps) data structure is selected based on the data accuracy and the resolution needed by the user.

Therefore, raster data represent points by a single cell, lines by sequences of neighboring cells, and areas by collections of contiguous cells.

8.4 ADVANCES IN MAPMAKING AND THE BIRTH OF GEOGRAPHIC INFORMATION SYSTEM

8.4.1 Historical Development of Mapmaking

From cave paintings to ancient maps of Babylon, Greece, and Asia, right into the 21st century, people have created and used maps as an essential tool to help them define, explain and navigate their way through the world. Several technical advances since the 18th Century helped mapmakers to accurately draw the general outline of the continents and locate their precise positions. The advances in mathematics and astronomy and dividing the Earth into lines of longitude and latitude were among the most notable advances.

There has been an ever increasing demand for maps and greater reliability on maps in the 21st Century. Specially, improvements in printing and photography, the mass production of maps and the ability to make accurate reproductions from more accurate data, as well as, the availability of airplanes and satellites made it possible to photograph and provide images of large areas at a time. In particular, the role of satellites is very important. Satellites perform continuous scans to provide detailed up-to-date maps of nearly the entire Earth.

8.4.2 Geographic Information System (GIS)

The geographic information system is a computer-based system that enables us to store, visualize, analyze, and interpret geographic data.

8.4.3 The Components of GIS

1. Hardware: The hardware is the computer and other devices (printers, plotters, scanners, etc.) attached with it. The hardware helps the GIS to operate..

2. Methods: Methods are well-designed plans and application specific procedures and rules describing how the technology is applied. This includes the following**:** ***guidelines,*** **specifications*****, standards and procedures.***

3. Software: GIS software provides the functions and tools users need to store, analyze and display geographical information. The key software components are**:** ***GIS software, database software, operating system (OS) software and*** **network** ***software.***

3. People GIS technology is clearly of limited value without people to manage the system and to develop plans for applying it. Users of GIS range from highly qualified technical specialists to planners, foresters, etc. to help with everyday work. ***Administrators,*** **Managers, GIS** ***technicians,*** **Application** ***experts ,End users*** **and** ***Consumer****s*

4. Methods, procedures and applications: Methods are well-designed plans and application specific procedures and rules describing how the technology is applied. This includes the following: ***guidelines, specifications, standards; and procedures.***

5. Data: Geographic data (also called spatial, or geospatial data) identifies the geographic location of features. One of the most important components of GIS is the data. It is very important that data must be accurate. There are different types of data: *vector data, raster data,* and image *data; and attribute data.*

8.4.4 Creating a Local Administrative Map with Arc Map

Step 1: Starting ArcMap, and adding data layers

To start ArcMap choose start ➡ all programs ➡ ArcGIS ➡ ArcMap 10.x.

8.5 MAKING AND INTERPRETATION OF GRAPHS, CHARTS AND DIAGRAMS

Computer programs such as Microsoft Excel, Microsoft Word and other spreadsheets like SPSS (statistical package for social sciences) are widely used for making graphs, charts and diagrams. There are so many types of graphs, charts and diagrams that can be produced on a computer.

Here are some common types out of which the user can make his or her choice. Bar graph, line graph and pie chart can be prepared in Microsoft Excel. Meanwhile, diagrams can be drawn in Microsoft Word

END