Unit 1

The meaning of land

Our dear learner, it is important to know that land has been defined differently by different writers and different scholars and from different angles. Thus, land does not mean merely the strict sense of the word, but whole of the materials and forces which nature gives freely for man's aid including, water, air, sunlight, heat, etc. From economics point of view, the word 'land' is used not merely in the sense of the soil or surface of the earth as it is ordinarily understood. It stands for all nature, living and lifeless. Hello learner, mention four of these things that have been given by nature. Well, let us compare answers. It includes all natural resources that we can get free from air, water and land. It covers the land surface, whether level or mountainous. It includes oceans, lakes and rivers, mineral deposits, rainfall, water-power, fisheries, forests and numerous other things which nature provides and man uses. The term 'land' thus embraces all that nature has created on the earth, above the earth, and below the earth's surface. Land is also seen as a physical entity in terms of its topography and spatial nature. This includes natural resources like the soil,

minerals, water and biota existing on the land. These components provide a variety of services essential to the maintenance of life-support systems and the productive capacity of the environment.

Our dear learner, let us also look at how The United Nations' Food and Agriculture Organization (FAO) defines land. According to the UN FAO, land is a delineable area of the earth's terrestrial surface, that encompasses all attributes of the biosphere immediately above or below this surface including those of the near-surface climate the soil and terrain forms, the surface hydrology (including shallow lakes, rivers, marshes, and swamps), the near-surface sedimentary layers and associated groundwater reserve, the plant and animal populations, the human settlement pattern and physical results of past and present human activity (terracing, water storage or drainage structures, roads, buildings, etc."). This definition suggests that land is vitally important for one very significant reason: people. The role of physical factors like geology, topography, hydrology, soils,

microclimates and flora and fauna are constantly on interaction under the influence of man's interference. This makes the land a holistic entity. Land thus becomes a dynamic and complex combination of physical as well as socio-cultural factors (FAO, 1995).

Dear learner, another definition of land is given by Stewart (1968). According to him, the term land is used in a "comprehensive, integrating sense to refer to a wide array of natural resource attributes in a profile from the atmosphere above the surface down to some metres below the land surface. Stewart continues that the main natural resource attributes are climate, landform, soil, vegetation, fauna and water. Let us also consider the definition of land given by Hoover and Giarratani (1984). They state that land "first and foremost denotes space. The qualities of land include, in addition, such attributes as the topographic, structural, agricultural and mineral properties of the site; the climate; the availability of clean air and water; and finally, a host of immediate environmental characteristics such as quiet, privacy, aesthetic appearance, and so on. Thus, it is obvious that land is a fundamental

resource which is to be considered from different dimensions.

Dear learner, from the above definitions, it is clear that land does not only mean the solid part of the surface of the earth, but also, the natural resources that are found within the earth and the use man puts these resources. Now, having identified the definition of land, let us go ahead to also identify the benefits that could be derived from land. Mention any three of these benefits. Compare your answers to what we have provided below.

1.2 Benefits that man derives from the land

Dear learner, you should understand that how man utilize land varies from one place to another, and this depends on the diverse landscapes (e.g. rolling hills, flat valleys, thick jungles, rocky mountain ridges). It is also important to note that the benefits man derives from the land may change over time too due to seasonal cycles (e.g., rainy and dry season) or more long-term climatic and geological changes. Though man is the late comer among the life forms on the earth, in many occasions he is

treated as a geomorphic agent considering his capability of changing the earth system. Man has mastered his environment by means of technology. Throughout the history of man, it is seen that man is in the quest for better living. This is attained by identifying and utilizing the means given by the physical environment around man. Land is considered to be the most important component of earth system as it is the immediate victim of all sorts of the human activities. Worldwide, land is being used with an increasing intensity to meet the needs of a growing population. These needs relate not only to increasing demands for food and space, but also to better material expectations also.

Earth is the habitat for millions of life forms including man. The co-existence and interdependence of biotic and abiotic elements of the earth system makes it live and unique. Hello our dear learner, we believe you understand the meaning of the biotic and abiotic? If yes, then well done. If your answer is no, then refer to unit one of this module. Man can’t exist alone on the earth. Land is not only a resource, but also a resource base by itself. It is the place over which man lives and

interacts. In spite of the various advancements he made in his thoughts and deeds man is basically a terrestrial animal. For many centuries he has been utilizing this resource extensively and became the master of the earth. Unlike other animals man is capable enough to change the entire landscape through his different activities.

Land is also inheritance with remembrance. Land is very meaningful not only for livelihood but also as an inheritance to work on and relay across the generations. In Ghana, almost all the extended families have family land which is usually passed on from one generation to the next generation.

Land as a factor of production is of immense importance to humankind. As has already been pointed out, everything that humankind use can be traced ultimately to land. Land may be rightly called the original source of all material wealth. The economic prosperity of a country is closely linked with the richness of her natural resources such as gold, bauxite, diamond, manganese, crude oil, etc. Generally speaking, it is true to say that a country is what nature has made it. It is possible that a country, rich in natural resources, may remain poor owing to some unfavorable factors. But if nature has been

unkind and has not given rich resources to a country, it will not be easy to make it prosperous.

Dear learner, mention other relevance of land to humankind. Compare you answer to which we have mentioned below. Obviously, the quality and quantity of agricultural wealth in a country depends on the nature of the soil, climate, and rainfall. Agricultural products, in their turn, form the very basis of trade and industry. Industrial prosperity further depends on the presence of rich coal-mines or waterfalls from which electricity can be generated. Localisation of industry depends on the proximity of power and raw materials and they are largely determined by nature. The presence of cheap and efficient means of transport is largely conditioned by the topography of a country.

Thus, all aspects of economic life-agriculture, trade and industry—are generally influenced by natural resources which the economists call ‘land’. Land or nature has a determining influence in moulding the life, occupations and standard of living of a people.

SESSION 2: PECULIAR FEATURES OF LAND

Dear learner, you are welcome to this session. In the previous session, we discussed the meaning and relevance of land to humankind. In this session, we shall discuss some peculiar features of land. We believe you can identify some of these peculiar features? We shall also discuss reasons that account for differences in the quality of land.

Objectives

By the end of this session, the student should be able to:

1. identify four peculiarities of land.
2. state three reasons that account for differences in the quality of the land.

Now read on ....

2.1 Peculiarities of Land

Land as a factor of production is quite peculiar. It possesses some important features, which makes its unique. Some of these peculiarities have been discussed below.

2.1.1 Land is a free gift of nature

It is not a 'produced' or man-made agent. It follows, therefore, that we have to accept it as it is. No doubt man tries to improve and modify nature. But he cannot completely master it. A poor soil and a bad climate are great handicaps in the way of industrial and commercial prosperity.

2.1.2 Land is limited in area

Efforts have been made to reclaim land from the sea, and thus add to the total land surface. Yet these efforts have produced only negligible results as compared with the total area al[r]eady in existence. Some land in Ghana has been reclaimed from the sea, but it is after all a small percentage of the total land surface of the world.

2.1.3 Land is permanent

It is not easy to destroy it. All other factors are destructible, but land cannot be completely destroyed. Even the havoc wrought by an atom bomb can be cured and natural powers restored after some time.

2.1.4 Land lacks mobility

Land cannot be moved bodily from one place to another. It lacks geographical mobility. But it can be put to many alternative uses and is thus mobile from a different point of view.

2.1.5 Land is of infinite variety

Land is not man-made. Nature has so made it ‘hat different pieces of land present infinite variations. None can say where the sandy soil ends and the clay begins. One type shades into the other. Such minute variations are not found in any other factor of production. Besides, the situation of different pieces of land also varies.

2.2 Factors that account for Differences in the Qualities of Land

2.2.1 Differences in Fertility

Some lands are too sandy and some too rocky; some are dry, while others receive ample rainfall. Some have a good climate, while others cannot support human life. The constituents of the soil also vary. All such things make a difference in the quality of the land.

2.2.2 Differences in Location

A piece of land situated near a market is more convenient than one away from it. Situation is an important differentiating factor. A favourable situation may make a less fertile piece of land equal in value to one which is more fertile but has a bad situation.

2.2.3 Natural Factors

Natural factors like the soil, climate, rainfall, topography and nature of the coast-line determine whether land produces much or little. A sandy soil and dry climate are sure to make it unproductive. On the other hand, an alluvial soil, a good climate, and timely rainfall are conducive to rich crops.

2.2.4 Human Factor

Man does not easily surrender to nature. If nature is unkind, he fights her and tries to conquer her. For instance, if rainfall is scanty, he can bring canal water. If soil is poor and deficient in certain properties, it can be improved by the addition of chemical manures. In fact, man plays an important part in remedying the deficiencies of nature and contributing to the productivity of the soil.

2.2.5 Situation Factor

The situation of land is of great importance. Fertile lands, situated in a remote corner of the country, away from the market, may be left uncultivated. The cost of transporting their produce may be prohibitive. Such land cannot compare with those pieces of land which, though not so rich, are near to market.

2.2.6 Extensive Cultivation

It is necessary to understand the distinction between extensive and intensive cultivation. In extensive cultivation, the farmer can have as much land as he

can manage. The methods of cultivation are generally primitive and unscientific. The yield per acre is comparatively low, but taken in relation to the capital and labour employed, it is large. Virgin lands yield good crops even though much work is not done on them. When they are exhausted, more land is available. Here seeds are just sown and crops harvested when ripe. Such methods were followed in new countries like the U.S.A. and Canada a hundred years back.

Intensive Cultivation

Intensive cultivation, on the other hand, implies constant cropping from the same area. If more and more capital and labour are applied to the same piece of land, the system of cultivation is known as Intensive. Greater application of labour and capital involves the use of artificial irrigation, deeper ploughing, sowing of improved seeds, use of artificial manures and of modern implements and machinery. In such cases, land yields more per acre. By cultivating it more intensively, the farmer tries to take the utmost out of his land. This method is followed in those countries where land area relatively to population is small.

In this session we discussed the peculiar features of land and also factors that accounts for differences in the quality of land. We mentioned that land is immobile.

CONCEPT OF LAND USE

Objectives

By the end of this session, the student should be able to:

1. define the concept of land use.
2. Explain three factors that influence the use of land

Concept of Land Use

The concept of land use simply means the surface utilization of all developed and vacant land on a specific point, at a given time and space (Mandal, 1990). According to the FAO concept, land use defines the human activities which are directly related to land, making use of its resources, or having an impact on them. In that context the

emphasis is on the function or purpose for which the land is used and particular reference is made to “the management of land to meet human needs” (FAO, 1976). Another definition of the concept is given by Jasbir Singh and Dillon (2005) who defined land use of an area as “the cumulative outcome of the historical events, the interaction of the economic forces with the natural environment and natural value of the society”. Land use thus involves the concepts of optimizing the land use potential, land evaluation for example, and of land use planning. A distinction should be made here between present land use (the way in which the land is used at present) and potential land use (how it could be used with or without improvements).

Factors of Land Use

The land use pattern of a region is an outcome of natural and socio-economic factors which decide the utilization of land by man over time and space. It is basically a function of four variables land, water, air and man. Each plays its own role in composing its life history. The efficient use of land depends on the capacity of man to utilize the land and to manage it. Land use may vary in nature and in intensity according to the purpose it serves –

whether it is food production, recreation, or mining – and the biophysical characteristics of the land itself. The use of land has intensified with the increase of population, method and technology. The use to which land is put is determined by the owners, farmers, institutions of Governments as the case may be, according to their perception as to the needs (Mandal, 1990). Such decisions are influenced by a large number of factors of physical and cultural aspects.

Physical Factors

Physical factors controlling land use include mainly geology, topography, climate and soil.

(i) Geology: Geological structures have both direct and indirect influence on land use of a particular region. The nature and composition of bedrock and distribution of mineral deposits are directly influencing the type of land use over a region. The indirect controls include drainage pattern, water table, structure and texture of regolith, process of soil formation, etc.

(ii) Topography: The land use on mountains, plains and plateaus are different. In mountainous

regions, hills and valleys are predominant factors in the nature and intensity of land use. In the regions of rugged terrain agriculture is not possible while in ideal slopes terraced farming is practiced. Most of the mountainous region is under forest cover and its type and density differs according to rainfall. Most of the plateaus are erosional surfaces characterised with featureless flat topped surface. Agriculture is having less scope here due to lack of enough soil cover. The valleys separating plateaus are very steep and narrow which are also not suitable for cultivation or settlement. About 75% of the world population lives in plain region up to an elevation of 300 m. from mean sea level. Plains are considered to be the most ideal topography for all types of land uses – agriculture, settlement, industry and transportation.

(iii) Climate: It is a dominant factor controlling the land use, especially agricultural land use. People always prefer favourable climatic conditions. They keep themselves away from regions of extreme climates. The climatic elements like temperature, rainfall, humidity, etc., play a decisive role in plant growth as well as in human activities.

(iv) Soil: The nature and distribution of different types of soil is also an important factor of land use.

Cultural Factors

The cultural factors of land use include demographic, social and institutional aspects of the society.

(i) Demographic factors: The distribution, growth and density of population in a particular area are decisive factors of land use. Growing population and resultant pressure on land raise land use conflicts. The rural urban character of the region is also an important factor of land use.

(ii) Social factors: Social set up of a region is also considered as a dominant controlling factor of land use. Social customs and beliefs of the people, land tenure system, size of landholding, social security, stand of political parties, etc., are important here. The level of education and technology is also a crucial factor which determines the intensity and nature of land use.

(iii) Institutional factors: It includes the factors like government policy, constitution, legislation,

stand of political parties, tax regulations, system of civil service, tariff control, etc.

Dear learner, we have come to the end of session three of this unit. In this unit, we discussed the definition of land use. We said that the concept of land use has several definitions. One of the definition was the surface utilization of all developed and vacant land on a specific point, at a given time and space. Another definition was the human activities which are directly related to land, making use of its resources, or having an impact on them. We also talked about the factors that influence land use. We saw both physical and cultural factors.

CLASSIFICATION OF LAND

Dear learner, you are welcome to this session. In the previous session, we discussed the peculiar nature of land and the differences in the quality of land. In this session, we shall discuss the basic classification of land.

Objective

By the end of this session, the student should be able to:

1. identify three classification of land.

Classification of Land

Dear learner, due to its varied dimensions, land has become the subject of detailed investigation by different disciplines. It is the basis for human life. It also supports other life forms. It also contains other resources which are useful to human society. Thus land has many facets and can be considered as a biological, economic, physical and spatial entity. An elaboration of these diverse facets will help a better understanding of this unique resource.

Land as a Biological Entity

Land is the basis for terrestrial biodiversity. All sorts of biological habitats are found on this resource base. Different species of flora and fauna are living on land and interact with each other. The

gene reserves for plants, animals and micro-organisms are preserved above and below the ground. Land acts as a great support system for all sorts of terrestrial life. It produces biomass which forms the energy for biotic materials. Land provides food, fodder, fibre, fuel, timber and other biotic materials for human use, either directly or through animal husbandry including aquaculture and inland and coastal fishery. Thus land can be viewed as the habitat or niche for various life forms and studied in detail. This approach, mainly followed by biologists, considers land as a supporting base for living organisms.

Land as an Economic Entity

From the economic point of view, our dear learner, land is considered a resource by itself. In traditional rural societies land is considered as a common good, a gift from God that permits the satisfaction of primary needs of mankind. Dear learner, mention any two primary needs of mankind that you know. If your answers include food and shelter, the bravo! In modern societies land is considered to be the most precious economic resource. Throughout

history, we have drawn most of our sustenance and much of our fuel, clothing and shelter from land itself. It is most fundamental to us as place to live and work. It is the basic source for food. It is a productive economic factor in agriculture, forestry, grazing, fishing and mining. Thus, in economic processes, land becomes an inevitable factor of production. Such production, in turn, leads to various activities which also occur over land. In addition land is also considered as a consumption good, property and capital. Land is considered to be the basis of social prestige, wealth and political power. Thus social scientists consider land primarily as an economic entity with social and political ramifications.

Land as a Physical Entity

Land is the physical basis of cultural growth. It should be considered as the solid crust of the earth composed of different minerals. The land constitutes the lithosphere of the earth. It is made up of rocks of varying physical and chemical characteristics. Land surface is not at all even. There exist natural irregularities, landforms, which

make the physical set up of the land so complex. Mountains, plains and plateaus are comparatively higher order landforms. They are formed as a result of tectonic movements of the earth interior. As the land surface is exposed to atmospheric mechanisms minor landforms are sculptured over it by gradational agents. It becomes the victim of gradational work of rivers, winds, glaciers, sea waves and underground water. Here it is clear that the nature of geologic structure and gradational process decides the regional topography of land. The hydrological properties of land are also noteworthy here. Earth is a lively planet and water is considered to be the elixir of life. The hydrological cycle, that is, the transfer of water through hydrosphere, atmosphere and lithosphere makes the life possible. The role of land in this cycle is very much significant. Land regulates the storage and flow of surface as well as groundwater resources. Land has a receptive, filtering and transforming function of hazardous compounds and influences their quality also. Thus, physical sciences consider land as a physical entity concentrating on its structure, form and composition.

Land as a Spatial Entity

Fundamentally, land occupies space. It extends over an area. However, it does not possess same characteristics in all its areal extent. There are varied combinations of physical, socio-cultural and economic parameters. Hence land possesses innumerable permutation combinations and their arrangement over the space is a matter of great importance for the advancement and sustenance of human society. This spatial variation or areal differentiation is the basic domain of geographical research. Thus geographers view land as the foundation on which man has organized himself in various forms of society. Even though land is a finite resource, the demand for this scarce resource is increasing along with the alarming growth of human population. The combination of population growth, limited expansion of arable land and the growing need for land for non-agricultural purposes increases the pressure on – and competition for – the available space. The advances in science and technology also should read along with this. Consequently, no other resource on the earth is put to overuse, misuse, abuse and even underuse than

land. The land surface and its inherent production potential are under continuous threat due to a variety of natural degradation processes and human-induced (mis)management. The ever-increasing pressure on land calls up on the need for scientific and judicious use of every piece of land. The pressure on existing land resource should be tackled effectively. This could be achieved only through developing various strategies for the optimal and sustainable utilization of this finite resource. Consequently, land use planning has attained very much significance. The information on land use / land cover and possibilities for their optimal use is essential for the selection, planning and implementation of land use schemes to meet the increasing demands for basic human needs and welfare. This information also assists in monitoring the dynamics of land use resulting out of changing demands of increasing population.

Dear learner, it is important to note that land can be classified in several ways. The basic means of classifying land include the use of biological, economic, physical and spatial entity. Mention any one example of each of the above classifications.

DEFINITION OF MAN-LAND INTERACTION

Dear learner, in the previous session, we discussed the concept of land use. We also discussed the various factors that influence land use. In this session, our major concern is on the meaning of man-land interaction as well as approaches that could be used to study land use.

Objectives

By the end of this session, the student should be able to:

1. Explain two major forms of interactions that go on between man and the land
2. Identify four approaches that could be used to study land use

Definition of Man-land Interaction

Our dear learner, man interacts with land in several ways. Before we continue, mention any two ways in which you interact with the land in your

community or school. Another important question that needs to be answered is: why do you interact with the land? Now, before you provide answers, let us define the concept of man-land interaction. Man-land interaction could be defined as a phenomenon which explains how humans interact with the land to fulfil their needs and how the land responds to these interactions. It also describes how humans have adapted to the land for their survival.

Approaches to Land Use Studies

Hello learner, it is important at this moment to note that land is a multi-faceted entity. Therefore, the study of land use may be done through varied approaches. Dear learner, mention any two of these approaches that you know. You have done well if your responses include what have been discussed below:

(i) Genetic approach: The study about the genesis of land use pattern is known as genetic approach. Here each and every plot of land can be estimated after considering the historical evolution of the cultural elements of the landscape.

(ii) Prescriptive approach: Prescriptive approach is the better utilization of limited land for the welfare of the human society, present and future.

(iii) Remedial approach: Here the study is for by suggesting the removal of a certain inferior use.

(iv) Case study approach: A detailed micro level study of land utilization characteristics of selected study area.

(v) Regional approach: Under this approach, the influence of regional geographical factors on various land uses is analysed by considering the region as a whole.

(vi) Ecosystem approach: This approach deals with the association of environmental factors which affect the distribution of various land uses.

(vii) Statistical approach: Under this approach, quantitative analysis of land use statistics is carried out for deriving inferences and conclusions.

(viii) Principle approach: Considering the pattern of land use of a particular area, certain models and general principles can be made. The approaches put forwarded by Von Thunen (1826) and Marx are examples.

In can be concluded that the tradition of man and land relationship is important to study as it provides answers of how an area can be settled, worked on, and how that land can be the most efficient it can be. The impact of man can be harmful and exponential on an environment. Further understanding of how man affects the land and how that land affects man leads to a better, healthier relationship with the earth and man!

HOW MAN INTERACTS WITH  THE LAND

Dear learner, let's use this opportunity to welcome you to this session. In the previous session, we defined the concept of man-land relationship. We also talked about the various approaches that could be used to study man-land relationship. In this session, we shall discuss the various ways in which man interacts with the land. We shall also discuss few theories that relate to man-land interaction. We believe and hope that you can mention some the ways through which you interact with the land in your community. Now, keep on reading.

Objectives

By the end of this session, the student will be able to:

1. Describe three ways in which man interacts with the land
2. discuss three theories that explain man-land interaction.

Ways in which man interacts with the land

Land is valued throughout the world, especially by those who live in close relationship with the Earth's natural endowments. Millions upon millions of families across the globe live in a close relationship with land and its associated waters, soils, forests, fisheries, flora and fauna for reasons and in ways that may not always be visible to the naked eye. Land has been essential to many kinds of human practices and to the building of diverse human societies. Land has shaped human society along several dimensions: economic, social and cultural (including spiritual), as well as political dimensions. Consider, for example, jungles, forests,

mountains, deserts, steppes, swamps, marshes, mangrove coasts, the open sea, and the Polar Regions. For some people, these places are inaccessible, inhospitable backwaters. But for others they may be sanctuaries: sought-out protected spaces where people seek refuge from state authorities, or from other civilisations, outsiders, intruders or newcomers.

What land is and what it means to man is found in many diverse relationships that man has built over time with people and other life forms in the landscapes where man lives. These relationships express particular understandings, perceptions and choices regarding our place and role in the world. The phrase “the multi-dimensional character of land” is a reference to all the possible ways in which land holds meaning for people and in which people find meaning in land.

Humans have the capacity to conform to the land and landscapes we encounter – for example, land influences where we settle, how we feed ourselves, what materials we build our homes with, which

spirits we perceive in the air, and it informs our stories of where we come from and why we are here. But the reverse is true too. Man, also has the capacity to alter the land and landscapes he encounters. Man has often sought to make the land adjust to his own visions of how it should be. It is not just that the surface of the earth has been an underlying factor in moulding humanity and influencing what we do and what choices we make. Human society has been a huge factor in shaping and re-shaping the surface of this planet too. This approach is what is referred to as the **Man-Land Tradition** (also called **Human-Environmental**, **Human-Land**, or **Culture-Environment Tradition**). It focuses on how man and earth interact and work together or against each other is a continuing process of struggles to better situate the two. Environmentalism, and also how man can be more efficient with the earth, is a very concerning topic. This tradition optimizes on how man works with earth and how its resources and area is used as well as how earth operates and how that affects man.

Theories concerning man's interaction with the land

Dear learner, there are a number of theories that relate to man's interaction with the land. Few of such theories have been discussed below:

The Theory of environmental determinism

The theory of environmental determinism dates back to the 15th century. Plato and Aristotle believed that the climate contributed to the Greeks being highly developed early on, as compared to other civilizations in hotter or colder climates. The Greek geographer, Strabo, also had similar ideas and wrote about climate affecting the development of human beings at the physiological level. This concept was developed further later on and proposed the idea that environmental factors were the origin of different skin colors.

environmental determinism is the belief that the environment, most notably its physical factors such as landforms and climate, determines the patterns of human culture and societal development.

Environmental determinists believe that ecological, climatic, and geographical factors alone are responsible for human cultures and individual decisions. Also, social conditions have virtually no impact on cultural development. The main argument of environmental determinism states that an area's physical characteristics like climate have a substantial impact on the psychological outlook of its inhabitants. These different outlooks then spread throughout a population and help define the overall behavior and culture of a society. For instance, it was said that areas in the tropics were less developed than higher latitudes because the continuously warm weather there made it easier to survive and thus, people living there did not work as hard to ensure their survival. Another example of environmental determinism would be the theory that island nations have unique cultural traits solely because of their isolation from continental societies.

Carrying capacity is a well-defined concept within population biology and indicates the maximum number of individuals of a given species that can be sustained within a defined area. Resource management seek to compare the availability of

goods and services from nature with the requirement for such goods and services for a given population and standard of living.

Ecological Footprint is an accounting measure that seeks to illustrate humanity's use of, or claims on, nature. This use of nature is expressed in the corresponding land area that is deemed to be required for production of the goods that are consumed and for the assimilation of the generated waste. This calculated land area is said to represent a population's ecological footprint.

The ecological footprint can be calculated for different levels of aggregation. The ecological footprint methodology requires the determination of the demand for natural resource goods and services as well as the supply of these; both expressed in the corresponding hectare bio-productive land (per person).

The **demand side** is calculated for six different uses of "ecological productive land"; these are land required for energy consumption, buildings, gardens, cropland, pasture and forests. Moreover,

the land use can be divided into five categorizes of consumption such as food, housing, transportation, consumer goods and services.

The calculation of the ecological footprint only takes account of the use of non-renewable resources to the extent that their use damages the biosphere, e.g. mining, processing and consumption. Currently, only the embodied energy in the non-renewable resources is taken into account.

The **supply side** is given by the quantitative size of an area that is ecological productive land or sea by a given year. The total supply side is usually divided per capita in order to estimate a particular country's bio-capacity. Due to the fact that the area of productive land is to be measured for a specific year, the supply side can vary over time, as it may, for example, increase due to technological innovations or improved management.

Dear learner, we have come to the end of session six of this unit. In this unit, we discovered

that nature has provided for us a sustainable and favorable environment for humans. However, humans have destroyed the perfect balance of our ecosystem by mercilessly utilizing the resources around them. Although human-environment interactions are inevitable for co-existence, maintaining a suitable balance is the key to survival. Our environment allows us to make certain modifications for our survival, but misusing this opportunity results in the destruction at a large scale. Humans have made significant changes to the environment in a way that suits them. However, they didn’t consider the consequences of such modifications. Hence, humans are responsible for the current devastation of our environment. We are now facing the challenge of climate change, which puts the future of our next generations at risk.

UNIT TWO

HUMAN ACTIVITIES THAT DESTROY THE LAND

THE MEANING AND INDICATORS OF LAND DEGRADATION

It is important to note that land degradation is a composite term. It has no single readily-identifiable definition, but instead describes how one or more of the land resources (soil, water, vegetation, rocks, air, climate, relief) has changed for the worse. For instance, landslide is often viewed as an example of land degradation in action – it changes the features of the land, causes destruction of houses, and disrupts activities.

In the longer term, however, the area of a landslide may regain its productivity. So, land degradation is far from being a simple process, with clear outcomes. This complexity needs to be appreciated before any attempt is made either to define land degradation or to measure it.

Land degradation is defined as the temporary or permanent decline in the productive capacity of the land, and the diminution of the productive potential, including its major land uses (e.g., rain fed arable, irrigation, forests), its farming systems (e.g.,

smallholder subsistence), and its value as an economic resource.

Land degradation is any change in the condition of the land which reduces its productive potential. This includes the loss of topsoil, the loss of vegetation and increasing soil salinity. Other definitions differentiate between reversible and irreversible land degradation. For instance, given sufficient time, all degradation can be reversed. For example, old landslide scars are noted for supporting better crops and more intensive agricultural possibilities than on the adjacent land not affected by landslides especially when the new soil is derived from less weathered rock materials, such as calcareous mudstones. So, reversibility depends upon whose perspective is being assessed and what timescale is envisaged.

Whilst soil degradation is recognised as a major aspect of land degradation, other processes which affect the productive capacity of cropland, rangeland and forests, such as lowering of the water table and deforestation, are captured by the concept of land degradation. Land degradation is, however, difficult to grasp in its totality.

Indicators of Land Degradation

There are several indicators that are used to measure land degradation. The "productive capacity of land" cannot be assessed simply by any single measure of land degradation. Therefore, several indicators of land degradation must be used

What are indicators? Indicators are variables which may show that land degradation has taken place. They are not necessarily the actual degradation itself.

For instance, the piling up of sediment against a downslope barrier may be an 'indicator' that land degradation is occurring upslope. Similarly, decline in yields of a crop may be an indicator that soil quality has changed, which in turn may indicate that soil and land degradation are also occurring. The condition of the soil is one of the best indicators of land degradation. Soil degradation is, in itself, an indicator of land degradation.

TYPES OF LAND DEGRADATION

Land degradation processes are interactive, sequential and cumulative. For instance, quite small depletions of small nutrients may lead to a decrease in soil organic matter. This in turn may weaken the physical structure of the top soil, making it easier for rainfall and surface runoff to remove it. In this way a relatively minor change in soil chemistry can lead to erosion. This results in different types of land degradation.

Land degradation by water

The removal of soil particles by the action of water is one major type of land degradation. This usually takes the form of sheet erosion in which there is a uniform removal of the thin layer of topsoil. It may also take the form of rill erosion. In this situation, small channels in the field are created. The topsoil could also be removed as a result of gully erosion where large channels, similar to incised rivers are formed. One important feature of land degradation by water is the selective removal of the finer and more fertile fraction of the soil

Land degradation by wind

This occurs as a result of removal of top soil by the action of wind. This is usually referred to as sheet erosion. In this type of land degradation, the surface of the land is removed in thin layers. It is important to note that the action of wind can create hollows and form other features in the surface of the land. Land degradation by either wind or action of water may lead to reduced soil productivity and change the nutrient in the land.

Land degradation through 'soil burial'

This may occur through flooding, where fertile soil is buried under less fertile sediments. The wind can also blow and sand may inundate grazing lands. Also, catastrophic events such as volcanic eruptions among other may cause soil burial land degradation.

Land degradation through removal of vegetation cover

Vegetation is important in many ways. It protects the soil from erosion by wind and water and it provides organic material to maintain levels of nutrients essential for healthy plant growth. Plant

roots help to maintain soil structure and facilitate water infiltration. Many activities of man such as surface mining or “galamsey” (illegal mining), logging and indiscriminate cutting of trees, construction activities, and poor farming practices may result in degrading the land.

Causes of Land Degradation

There are several factors that lead to land degradation in our communities. Majority of these factors are as a result of man’s interaction with the physical environment. The causes of land degradation differ depending on the inherent characteristics of the land, specifically soil type, slope, vegetation and climate. Thus, an activity that, in one place, is not degrading may, in another place, cause land degradation because of different soil characteristics, topography, climatic conditions or other circumstances. So, equally erosive rainstorms occurring above different soil types will result in different rates of soil loss. It follows that the identification of the causes of land degradation must recognise the interactions between different

elements in the landscape which affect degradation and also the site-specificity of degradation.

Pollution

Pollution, in whatever form, whether it is air, water, land or noise is harmful the land and its resources. Air pollution, for instance, pollutes the air that we breathe which causes health issues. Water pollution on the other hand degrades the quality of water that we use for drinking and other purposes. Land pollution results in degradation of earth's surface as a result of human activities.

Overpopulation

Rapid population growth puts strain on natural resources which results in degradation of our land. Mortality rate has gone down due to better medical facilities which have resulted in increased lifespan. More population simply means more demand for food, clothes and shelter. You need more space to grow food and provide homes to millions of people. This puts unbearable pressure on the land thereby causing its degradation.

Deforestation

Deforestation causes land degradation on the account of exposing soil minerals by removing trees and crop cover, which support the availability of humus and litter layers on the surface of the soil. Vegetation cover primarily promotes the binding of the soil together and soil formation, hence when it is removed it considerably affects the capabilities of the soil such as aeration, water holding capacity, and biological activity. When trees are removed by logging, infiltration rates become elevated and the soil remains bare and exposed to erosion and the buildup of toxicities. Some of the contributing activities include logging and slash and burn techniques used by individuals who invade forest areas for farming, rendering the land unproductive and less fertile in the end.

Creation of Landfills Sites

Landfills pollute the environment and destroy the beauty of the land. Landfill sites are created as a result of large amount of waste that is generated by households, industries, factories and hospitals. Landfills pose a great risk to the health of the environment and the people who live there. Landfills produce foul smell when burned and cause huge environmental problems.

Physical Factors

There are several physical factors contributing to soil degradation distinguished by the manners in which they change the natural composition and structure of the soil. Rainfall, surface runoff, floods, wind erosion, tillage, and mass movements result in the loss of fertile top spoil thereby declining soil quality. All these physical factors produce different types of soil erosion (mainly wter and wind erosion) and soil detachment actions, and their resultant physical forces eventually change the composition and structure of the soil by wearing away the soil's top layer as well as organic matter. The physical forces and weathering processes lead to the decline in soil fertility and adverse changes in the structure of the soil.

Biological Factors

Biological factors refer to the human and plant activities that tend to reduce the quality of the soil. Some bacteria and fungi overgrowth in an area can highly impact the microbial activity of the soil through biochemical reactions, which reduces crop yield and the suitability of soil productivity capacity. Human activities such as poor farming

practices may also deplete soil nutrients thus diminishing soil fertility. The biological factors affect mainly lessens the microbial activity of the soil.

Industrial and Mining activities

The land is chiefly polluted by industrial and mining activities. As an example, mining destroys crop cover and releases a myriad of toxic chemicals such as mercury into the soil thereby poisoning it and rendering it unproductive for any other purpose. Industrial activities, on the other hand, release toxic effluents and material wastes into the atmosphere, land, rivers, and groundwater that eventually pollute the soil and as such, it impacts on soil quality.

Urbanization

Urbanization has major implications on the soil degradation process. Foremost of all, it denudates the land's vegetation cover, compacts soil during construction, and alters the drainage pattern. Secondly, it covers the land in an impermeable layer of concrete that amplifies the amount of surface runoff which results in more erosion of the topsoil. Again, most of the runoff and sediments

from urban areas are extremely polluted with oil, fuel, and other chemicals. Increased runoff from urban areas also causes a huge disturbance to adjacent watersheds by changing the rate and volume of water that flows through them and impoverishing them with chemically polluted sediment deposits

EFFECTS OF LAND DEGRADATION

Drought and aridity

Drought and aridity are problems highly influenced and amplified by land degradation. The contributing factors to soil quality decline such as overgrazing, poor tillage methods, and deforestation are also the leading causes of desertification characterized by droughts and arid conditions. In the same context, land degradation may also bring about loss of biodiversity**.**

Loss of arable land

Because soil degradation contributes to land degradation, it also means that it creates a significant loss of arable land. Most of the crop

production practices result in the topsoil loss and the damage of soil's natural composition that makes agriculture possible.

Increased flooding

The land is commonly altered from its natural landscape when it rids its physical composition from soil degradation. For this reason, the transformed land is unable to soak up water, making flooding more frequent. In other words, soil degradation takes away the soil's natural capability of holding water thus contributing to more and more cases of flooding

Pollution and clogging of waterways

Most of the soil eroded from the land together with the chemical fertilizers and pesticides utilized in agricultural fields are discharged into waterways and streams. With time, the sedimentation process can clog waterways, resulting in water scarcity. The agricultural fertilizers and pesticides also damage marine and freshwater ecosystems and limit the domestic uses of the water for the populations that depend on them for survival.

Impact on Human Health

Human health might be at the receiving end as a result of the land degradation. Areas exposed to toxic air pollutants can cause respiratory problems like pneumonia and asthma. Millions of people are known to have died of due to indirect effects of air pollution.

Loss for Tourism Industry

The deterioration of environment can be a huge setback for tourism industry that relies on tourists for their daily livelihood. Environmental damage in the form of loss of green cover, loss of biodiversity, huge landfills, increased air and water pollution can be a big turn off for most of the tourists.

Measures to Mitigate Land Degradation

Reducing deforestation

Avoiding deforestation completely is an uphill task. However, deforestation can be cut down and this can create an impressive way of reshaping and restoring forests and vegetation cover. As populations grow, individuals can be sensitized and

educated regarding sustainable forest management and reforestation efforts.

Also, preserving the integrity of guarded areas can significantly reduce demonstration. With the reduction of deforestation, soil's ability to naturally regenerate can be restored

Land reclamation

The outcomes of soil erosion and quality decline are widely irreversible. Soil organic matter and plant nutrients can be replenished. To restore the lost soil mineral matter and organic content, it would require what is known as land reclamation. Land reclamation encompasses activities centered towards restoring the previous organic matter and soil's vital minerals. This may include activities such as the addition of plant residues to degraded soils and improving range management. Salinized soils can be restored by salt level correction reclamation projects and salinity control. One of the simplest but most forgotten methods of land reclamation is the planting of vegetation such as trees, crops, and flowers over the affected soils. Plants act as protective covers as they are helpful at making the soil stronger by stabilizing the land

surface. One of the simplest but most forgotten methods of land reclamation is the planting of vegetation such as trees, crops, and flowers over the affected soils. Plants act as protective covers as they are helpful at making the soil stronger by stabilizing the land surface.

Preventing salinization

Just like the old adage states that “prevention is better than cure,” so does the same concept apply in solving the worldwide problem of land degradation through salinization. The costs of preventing salinization are incredibly cheaper than the reclamation projects in salinized areas. Consequently, actions such as reducing irrigation, planting salt-tolerant crops, and improving irrigation efficiency will have high payoffs because the inputs and the labor-demanding aspects associated with reclamation projects are zero. Preventing salinization in the first place is thus an environmentally friendly means of offering a solution to soil degradation.

Conservation tillage

Proper tillage mechanisms hold as one of the most sustainable ways of avoiding soil quality decline.

This is otherwise known as conservation tillage, which means tillage mechanisms targeted at making very minimal changes to the soil's natural condition and at the same time improving the soil's productivity. Examples include leaving the previous year's crop residue on the surface to shield the soil from erosion and avoiding poor tillage methods such as deep plowing.

Traditional measures to solve address land degradation

Land conservation practices have always been an integral part of traditional farming, and various methods are employed by the farmers and traditional folks to ensure the sustainability of the land it its resources. Indigenous practices such as multiple cropping and minimum tillage provide a ground cover and limit the degradation of the land. In fact, every farm operation, from land clearing to crop harvesting has a conservation aspect to it.

Land clearing

The traditional method of land clearing employs simple tools like machetes, cutlasses and axes. The farmer underbrushes the native vegetation by cutting down shrubs, herbs and climbers, and

normally causes little or no disturbance to the soil. Since the farmer does not practice open, clean and clear cultivation, the big trees are left undisturbed, serving as wind breaks while their canopy helps to reduce the impact of rain. The advantages of traditional shows that traditional farming based on in-complete clearing and mixed cropping resulted in negligible run-off and soil erosion compared with mechanically cleared plots.

Tillage practices

In the traditional farming systems, extensive pre-planting cultivation is not performed except for root and tuber crops such as cassava and yam. Most plantings are on the flat, and where ridges or mounds are required, they are made with hoes or other cultivation hand tools. This practice often inflicts minimum disturbance to the fragile soil. Minimum tillage could slow the rate of decline in soil nutrients compared with other tillage methods. When yam, cassava, sweet potatoes are harvested, from mounds or ridges, hollow spaces are left behind. These spaces are first filled with water during the first few rains, thereby preventing increased run-off and erosion. Furthermore, the

residues of these crops are left on the field to decay and later contribute to the soil organic matter pool.

Mulching

Mulching improves the chemical, physical and biological properties of the soil.

It reduces erosion by protecting soil against raindrop impact, impedes the flow of run-off, reduces nutrient loss, soil detachment and dispersion and maintains a high soil infiltration rate. Mulching of mounds has become an established practice because farmers know from experience that soil tillage is associated with erosion. Traditional African farmers often practice two major forms of mulching. These are in-situ mulching and live mulching. In-situ mulching occurs from crop residue or cover crop which occupied the land during fallow. It is often common in cocoa farms or in plots where grains are planted and at times in old cassava farms. The weeds are slashed and left to rot in-situ. Live mulching on the other hand consists of food crops inter-planted with established cover crops. The traditional farmer uses melon, pumpkin, sweet potato, calabash and gourds for this purpose.

Their spreading leaves shade and cool the soil and prevent weed growth.

Mat layer mechanism

The mat layer is formed by the decomposing layer of crop residues or litter on the forest floor or a layer of organic materials (twigs, leaves and branches) that form a cover on the soil surface. This layer reduces surface run-off, leaching and soil temperature. In an undisturbed forest, and even in land under fallow, the nutrients move from the soil to the vegetation and back to the soil through litter fall. Consequently, the removal of the top vegetation, for any reason, disturbs the established equilibrium and soil degradation follows fast. Therefore, under the traditional farming system, a mat layer is maintained.

Weeding method

In traditional African agriculture, mechanical weed control is practiced using the hoe, cutlass or by hand pulling. Hoeing is kept to the barest minimum, and during the process the operator shakes soil off the weeds and returns them into the furrows, sometimes turning the dead weeds upside down. During slashing the aerial parts of the weeds are removed,

allowing the bottom part inside the soil to decay gradually. When weeds are pulled out manually, the treatment of the weeds follows the same pattern as hoeing.

Cropping systems

Multiple cropping is the dominant system in African agriculture. Under this system, intercropping is most commonly practiced. Generally, multiple cropping provides a multi-canopy structure and a continuous vegetative cover throughout the year, thereby protecting the soil against raindrop impact and reducing run-off and soil erosion. The system mimics the natural forest ecosystem having about six strata, namely: the dominant trees, semi-dominant trees, saplings, shrubs, weeds and the mat layer. The dominant stratum in traditional cropping systems is represented by left over trees that had been incapacitated by fire, living oil palms and economic trees like mahogany and iroko. The semi-dominant stratum is represented by plantain, pawpaw and other fruit trees that had been pruned to reduce the shade and increase inlet radiation. The sapling stratum is represented by maize and trailing yam vines whose stakes had been tied together. The

fourth stratum is dominated by okra, pepper, tomato. The fifth stratum is occupied by creepers, namely, melon, cowpea, sweet potato and calabash. These are classified as live mulch. When the plants shed their leaves, they form the 6th stratum of mat layer together with left over litter, pruned twigs and weeds left in the furrow and roots.

Fallowing

Bush fallowing is the most common method of soil fertility maintenance in tropical Africa. The farmer depends on the restorative ability of the vegetation that colonises abandoned farmland at the cessation of cropping to rejuvenate soil fertility. Soil fertility in the traditional setup is associated with herbs and trees, and the number and size of trees and shrubs increase as fertility increases with the age of fallow. In traditional agriculture there are indicator plants. As the vegetation cover increases, the light intensity and temperature decrease, soil moisture increases and soil fertility is enhanced enabling the growth of broad-leafed weeds (indicators of soil fertility build-up). During the first three years of fallow, there is a slight decline in the level of organic matter

UNIT THREE

LAND CONFLICT IN GHANA

Dear learner, you are welcome to this session. In this session, we shall discuss the various land issues in Ghana. Issues such as land conflicts and the types of land conflicts shall be discussed.

Objectives

By the end of this session, the student should be able to:

1. define the concept of land conflict
2. identify three types of land conflict in Ghana.

Definition of land conflicts

Dear learner, we believe this is not your first time of hearing the word “conflict”. You might have come across it from different places. Well, let’s provide our version of the definition of conflict. A conflict, as defined by sociologists, is a social fact in which at least two parties are involved and whose origins are differences either in interests or in the social position of the parties (Imbusch, 1999). Consequently, a land conflict can be defined as a social fact in which at least two parties are involved, the roots of which are different interests over the

property rights to land: the right to use the land, to manage the land, to generate an income from the land, to exclude others from the land, to transfer it and the right to compensation for it. A land conflict, therefore, can be understood as a misuse, restriction or dispute over property rights to land (Wehrmann, 2005). Land conflicts defined as such can be aggravated if the social positions of the parties involved differ greatly.

Land conflicts, can become engines of change if they lead to massive protest and consequent changes in policies and their implementation. It is therefore important to deal with land conflicts in a constructive manner, instead of ignoring them or simply trying to stop them. In any event, conflict theorists agree that conflict is unavoidable for any society. Dear learner, according to Zartman (1991: 299), “Conflict is an inevitable aspect of human interaction, an unavoidable concomitant of choices and decisions. Conflict can be prevented on some occasions and managed on others, but resolved only if the term is taken to mean the satisfaction of apparent demands rather than the total eradication of underlying sentiments, memories, and interests.

Only time really resolves conflicts, and even the wounds it heals leave their scars for future reference. But short of such ultimate healing, much can be done to reduce conflict and thereby release needed energies for more productive tasks". Hello learner, compare the above quote to any conflict resolution process that has occurred in your community or in your country.

1.2 Types of land conflicts

Hello our dear learners, in our various communities, we have different types of disputes over land. In some cases, the disputes occur as a result of ownership of land, boundary disputes, eviction of settlers from a parcel of land by the owners, sales of someone's land without his or her knowledge, among others. Based on this, we can identify four major types of land disputes. However, this classification is based on land involved. That is, either the land belongs to the state or it is a private or common property), the specific object of the conflict as well as the legitimacy of actions and the level of violence used by the parties.

1.2.1 Conflicts occurring on all types of property

Boundary conflicts: Dear learner, there are conflicts on land that occur all over the world especially relating to the borders of the countries involved. Learner, name one example of boundary conflict you know. Well! You have done well if your answer includes the Ghana Cote d'Ivoire border. Another example is the Nigeria and Cameroon border conflict. It is important to know that these border conflicts occur as a result of mineral deposits or natural resources that are found along the borders which becomes sources of interest to parties or countries involved.

Inheritance conflicts: Dear learner, inheritance conflict is common in Ghana especially those relating to land inheritance. Now, let us find out from you. Have you ever inherited any land from any of your relatives? Or do you know of anybody who inherited a parcel of land from a relative? Was the documentation of the land properly done? Now, if documentations on land that are inherited are not properly done, it mostly leads to inheritance

conflicts. This type is common in some parts of Ghana. Name any two towns or communities in Ghana which are suffering from this type of conflict. This may also be referred to as ownership conflicts due to lack of land registration.

Ownership conflicts between state and private/common/collective owners: This is another type of land conflict. In some cases land conflict may arise as a result of disagreement between the state and private organisations or individuals. Our dear learner, the government may sometimes show interest and take possession of a parcel of land that belongs to some private individuals. If the appropriate procedures and steps are not taken for the government to acquire that land, then it leads to a conflict.

Multiple sales/allocations of land: Dear learner, this type of land conflict is also common in Ghana especially in urban centers where people have begun building houses. What usually happens is that land owners who are mostly chiefs sell a parcel of land to multiple people at different times. This in

the long run may lead to a clash between those who have acquired the land from the same person. Dear learner, have any of your family members ever experienced this type of land conflict?

SESSION 2: CONSEQUENCES OF LAND CONFLICTS

Hello learner, you are welcome to this session. We believe that you enjoyed the previous session? Well! You will also enjoy this session. In the previous session we talked about the definition of conflicts. We also discussed the various types of conflicts. In this session, we shall discuss the consequences of conflicts. Dear learner, mention any three consequences of any conflict that occurred in your community. Now, compare your answers to what we have provided below. We shall also discuss some measures that could be put in place to resolve land-related conflicts in our communities.

Objectives

By the end of this session, the student will be able to:

1. explain three consequences of conflict
2. discuss three measures that could be used to resolve land-related conflicts
3. describe three stages of conflict resolution

2.1 Consequences of Land Conflicts

Dear learner, we believe that you are aware that land conflicts have a lot of consequences. Good, it will interest you to know that conflicts relating to land could have both negative and positive consequences. Now, we would like you to mention two positive consequences of land conflict. Well done if you were able to do that. Now, let us begin by identifying some of the negative consequences of land conflicts.

Land ownership conflicts have negative effects on individual households as well as on the nation's economy. They increase costs, slow down investment, can result in the loss of property for a conflict party and reduce tax income (land tax, trade/commercial tax) for the state or municipality.

The lower the transparency in land markets, the less equal is information being disseminated, and the weaker constitutive and regulatory institutions are, the more likely it is that land conflicts occur. People therefore need to spend a lot of time and money on searching for information and monitoring agreements/contracts. This means that land conflicts are associated with high transaction and agency costs or *vice versa*, that (relatively) high transaction and agency costs indicate a high probability of land conflicts.

Conflicts over the use of land generally have a negative impact on the poor or on the natural or building environment. They either decrease quality of life for parts of society or, if they are addressed and ameliorated, contribute to additional state expenditures and therefore have an impact on the national wealth.

Land conflicts also increase social and political instability. Where ever there occur a lot of multiple sales, evictions, land grabbing etc., people lose confidence in the state and start mistrusting each other. Social and political stability suffers even more when land conflicts are accompanied by violence. Dealing with land conflicts therefore also

means to re-establishing trust and confidence in public as well as private institutions. Land conflicts affect different groups in different ways. Not only do they generally have a stronger impact on the livelihood of the poor than that of the rich, but they also impact differently on men and women, urban and rural populations, farmers and pastoralists etc., with groups such as squatters, ethnic minorities or orphans being extremely marginalised.

2.2 Land-related Conflict resolution

Dear learner, having identified the consequences of land related conflict, it is important to also point out measures that could be put in place to resolve such conflicts. Now, let's continue to read as we identify some of these measures.

A first step in land conflict resolution is a thorough analysis of the conflict. It is necessary to have a clear and deep understanding of the special characteristics of the particular conflict, the causes of the conflict and the actors involved (including

their positions, attitudes, behaviour, interests, needs and motivations), as well as their relations with each other. Depending on the complexity of the conflict, frame conditions and the historical development of the conflict may have to be identified as well.

Once the details of a conflict's development over time are known, its different stages can be identified. This allows the current degree of intensity of a conflict to be determined, perhaps showing that it is just before escalation so that urgent actions are needed, for instance. These stages of conflict reflect the changes in activity, intensity, tension and violence of conflicts over time, from the first moments of tension to their resolution; resolution can be anything from a win-win solution to the total destruction of the enemy, which often results in self-destruction as well. Although each conflict has its own dynamic, every conflict goes through at least three phases: pre-conflict, in-conflict or crisis, and post-conflict (Fisher et al. (2000). Hello learner, you must understand that in conflict management, these three steps cannot be neglected. Let us take these phases

one after the other and have a detailed discussion of each.

Pre-conflict: A conflict generally starts with an incompatibility between the goals of two or more parties, which has the potential to lead to open conflict. At this stage, the conflict is hidden from general view, although one or more of the parties is probably aware of the potential for confrontation. There may be tension between the parties who often try to avoid each other at this point.

In-conflict or crisis (Confrontation): The second phase of a conflict is more open and marked by occasional fighting or other low levels of violence. Each side is looking for resources and supporters. Polarisation between the parties increases. At this level the conflict is at its peak. When the tension and/or violence are most intense a conflict can easily get out of control. There is now rarely any communication between the parties, who are fighting with and publicly accusing each other. In worst case, the different sides are at war. In one way or another, the crisis will end. One party may defeat

the other or give in, both parties may agree to negotiate, or a third party may impose a settlement. In any case, tension and violence decrease but the conflict is not yet settled.

Post-conflict: Dear learner, at this stage, relations have become more normal again. However, if the roots of the conflict have not been adequately addressed and if the incompatible goals still prevail, chances are good that the situation will turn again into a pre-conflict. It is very important to identify the current stage of the conflict in order to be able to choose the appropriate manner of intervention or dispute resolution. More information about the actors can be found by completing or "peeling" the conflict onion – identifying their positions, interests and needs, as well as their desires and fears. Once the interests, needs, desires, and fears of the parties involved in the conflict have been identified, it becomes easier to find ways out of the conflict. Someone who wants money or status does not necessarily need this particular piece of land, or indeed any land at all. His desires and needs may be met in other ways. However, someone whose existence is in danger because he has nothing other

than this piece of land definitely needs land, although not necessarily this exact piece, so long as the alternative is located in an acceptable location. But if emotional needs are involved and people are especially attached to a given piece of land because it has special meaning for them, this must be taken into account.

SESSION 3: TYPES OF LAND-CONFLICT RESOLUTION

Objectives

By the end of this session, you should be able to:

1. discuss three different types of land conflict resolution

3.1 Different Types of Land Conflict Resolution

Once land conflicts are identified and brought to the level of discussion, their settlement can be started. This can involve classical or alternative ways of conflict resolution, special land tribunals, land management measures, special local contracts, land conflict resolution by the victims and land governance. Choosing a suitable form of conflict

resolution depending on the degree of escalation present, eight strategies of conflict resolution are recommended (Glasl, 1999, modified):

3.1.1. Facilitation: The facilitator helps the parties come together, the parties still being able to solve the problem by themselves. Facilitation can be applied in a very early stage of pre-conflict to defuse the conflict in time and avoid escalation.

3.1.2. Moderation: The moderator helps the parties come together to clarify and settle minor differences, the parties still being able to solve the problem by themselves. Moderation can be applied in a pre-conflict situation to defuse the conflict in time and avoid escalation.

3.1.3. Consultation: The “tutor” accompanies the process, working on the deeply internalised perceptions, attitudes, intentions and behaviours of the parties in order to calm them. Consultation is yet another approach useful during the stage of pre-conflict to stop the conflict progressing toward

becoming a full-blown crisis. It is more appropriate than simple moderation in a case where a latent conflict has manifested itself for a longer time and has already created prejudices and hostility.

3.1.4. **Socio-therapeutic consultation**: This special form of consultation focuses explicitly on destructive, dysfunctional or neurotic behaviour due to psychological damages caused by former negative experiences in life. Socio-therapeutic consultation is extremely helpful if the parties involved have already lost face during the processes of peace-making, peacekeeping and peacebuilding, as it helps in the understanding of one own behaviour as well as that of one's opponent, and therefore creates understanding and a willingness to forgive one another.

3.1.5. Conciliation: This is a mixture of consultation and mediation. The conciliator helps the parties to negotiate while – whenever necessary – addressing internalised perceptions, attitudes, intentions and behaviours with the objective of reducing prejudices and hostility. Conciliation can

be applied in pre-conflict and early conflict situations as long as the parties are able to talk to each other.

3.1.6. Mediation: Mediation, too, requires that the parties are willing to face each other and to find a compromise. The mediator follows a strict procedure, giving each party the opportunity to explain its perceptions and to express its feelings, forcing the other party to listen and finally moderating a discussion aimed at finding a solution with which both parties can live. Preferably, the moderator should not propose solutions but may lead the way towards them. At the end, a written contract is signed by all parties and the mediator seals the agreement. Mediation can be done in any situation as long as the parties are willing to find a compromise.

3.1.7. Arbitration: Arbitration follows strict rules too. Unlike the moderator, however, the arbitrator is expected to make direct suggestions on how to settle the conflict. He is more influential and powerful than moderators, tutors or mediators. He

has decision-making authority. Therefore, arbitration can be used even at the peak of a conflict. What makes it different from adjudication is that the arbitrators are accepted and trusted by both parties. The arbitrator may be appointed by all conflicting parties or be a respected person traditionally responsible for dispute settlement.

8. Decision by a powerful authority (adjudication) should always remain the last resort. In the case of moderation, consultation, conciliation, negotiation and mediation the third party helping to resolve the land conflict only influences the process, not the outcome. These are all consensual approaches where the outcome is exclusively defined by the parties. Only in the non-consensual approaches of arbitration and adjudication is the outcome defined by the third party While land conflicts taking place at the micro and meso social level can normally be addressed by any of these means of conflict resolution (although this may depend on the stage of conflict, the degree of escalation and the (a)symmetry of the conflict), land conflicts occurring at the macro social level

often cannot as they require additional institutional changes before the conflict can be settled.

Dear learner, in this session, we discussed the various types of land conflict. We learnt that we can have classical or alternative ways of conflict resolution, special land tribunals, land management measures, special local contracts, land conflict resolution by the victims and land governance. Choosing a suitable form of conflict resolution depends on the degree of escalation present. The conflict resolution strategies include facilitation, moderation, consultation, and socio-therapeutic consultation.

SESSION 4: PREVENTING THE OCCURRENCE OF LAND CONFLICT

Dear learner, we believe that you have heard the popular saying that prevention is better cure. What does it mean especially in relation to land conflict? Well! It means that it is better for use to be extra vigilant in preventing the occurrence of land conflicts even before we begin to search for amicable solution to land conflicts. Looking at all

the procedures of resolving a land conflict, we would conclude that it is easier to prevent a conflict than to cure it. In resolving a conflict, we cannot do much about the harm that has already been done. It is therefore a more worthwhile investment for every government to invest in land conflict prevention measures by putting the right policies in place and ensuring implementation of what the policies require" (Kariuki, 2005: 99).

Objective

By the end of this session, you should be able to:

1. state three measures to prevent the occurrence of land conflict.

Now, read on…

4.1 Preventing the occurrence of land conflict

Hello learners, when we say we should prevent land conflict, then we mean simultaneously avoiding institutional deficits, limiting extreme needs for land and reducing opportunities to make excessive

economic profit from the land market. This can be achieved by a combination of correcting institutional weaknesses and introducing good land governance. Once both are in place – functioning land market institutions and a good governance-based process by which decisions are made and implemented regarding the access to and use of land – the deeper causes of land conflicts will admittedly continue to trigger some land conflicts, but these will be fewer in number and should be less violent. Both approaches have to be accompanied by intentionally creating an awareness of the destructive nature of land conflicts – not only for individuals but also for entire societies and national economies.

4.1.1 Raising awareness

Many land conflicts can be predicted and if not avoided at least mitigated if provisions are made against them in time. It is therefore crucial to be aware of those changes and occurrences that have the potential to trigger land conflicts. Once a potential cause of conflict has been identified, the extent of possible land conflicts and the scope of their social, economic, ecological and political consequences should be roughly calculated, and

immediately communicated to decision-makers and responsible land management experts at both the central and local level. Land conflict experts should preferably discuss with these decision-makers which measures should be taken to avoid massive land conflicts. Failing that, proposals should be made to them.

4.1.2 Fighting institutional weaknesses in the land market

Although weaknesses in the institutional frame of the land market are not the cause of land conflicts, their removal can hinder many conflicts from escalating or even occurring at all. Four different kinds of institutions influencing the land market have to be considered. These are: Constitutive institutions, Regulatory institutions, Supportive institutions, Complementary institutions. Legal security is the key to preventing land conflicts. Where property rights are clearly defined and secured and where conflicting interests over land can be negotiated in a fair and predictable environment, conflicts over who owns or may use which piece of land can be reduced to a minimum.

The constitutive institutions of the land market include:

4.1.3 Tenure security

Clearly defined and secured property rights to land, i.e. widespread tenure security for all groups in society. This may include the recognition of customary and informal rights. It may also include the introduction of new forms of intermediate tenure.

4.1.4 Land registration

To secure property rights, all existing claims have to be documented and overlapping interests addressed and clarified in a fair and transparent way. Land registration can be done in many different ways and does not necessarily have to include a technology-based land information system or highly accurate surveying. It should be as simple and cost effective as possible, “corruption-proof”, adapted to local conditions, established with active public participation and reflecting all legitimated property rights: formal, informal,

customary and religious; state, private and common/collective; primary and secondary; permanent and temporary. In areas with great potential for land conflicts such as peri-urban areas, systematic land registration should be considered.

4.1.5 Customary land administration

To prevent conflicts resulting from either legal pluralism or a misuse of customary power over land allocation, a number of provisions can be made: Legal recognition of customary land rights, Identification of the boundaries of customary areas, Identification of tasks and responsibilities of customary chiefs, Improvements in record-keeping, to avoid multiple allocations of the same parcel, Adjustment of customary land law to conform with the national constitution and human rights doctrines in regard to equity, Establishment of local control mechanisms and the introduction of sanctions for chiefs misusing their authority by irregularly allocating land for their own profit, empowerment of communities living on customary land classified as state land to directly negotiate with investors who receive concessions there from the state in order to

prevent people being dispossessed of their customary rights but instead to share in the profit made from and on their lands.

4.1.6 Rule of law

The establishment of the rule of law is a prerequisite for all other measures for the prevention and resolution of land conflicts. This includes clearly defined, non-concealing, non-contradictory laws, legal norms and by-laws without loopholes, clearly defined roles, functions and responsibilities of all participating actors, a hierarchical court structure, administrative courts responsible for monitoring, an independent media and public participation in the making of laws and rules (Diaby-Pentzlin/Zimmermann, 1999).

Dear learner, we have discussed various measures to prevent the occurrence of land conflict. We said that land conflict prevention can be achieved by a combination of correcting institutional weaknesses and introducing good land governance. Once both are in place – functioning land market institutions and a good governance-based process by which

decisions are made and implemented regarding the access to and use of land – the deeper causes of land conflicts will admittedly continue to trigger some land conflicts, but these will be fewer in number and should be less violent.

SESSION 5: LAND TENURE SYSTEM IN GHANA

Our dear learner, you are welcome to this session. In this session, we shall define land tenure system in Ghana. We shall also talk about the types of land tenure system in Ghana.

Objectives

By the end of this session, you should be able to:

1. define land tenure system
2. state two types of land tenure system

5.1 Land Tenure Systems in Ghana

Land tenure denotes the system of landholding, which has evolved from the peculiar political and economic circumstances, cultural norms and

religious practices of a people regarding land as a natural resource, its use and development. Implicit in this definition are the rules, regulations and institutional structures both customary and enacted legislations, which influence the holding and appropriation of land and its resources for socioeconomic development (Ministry of Lands and Forestry, 2003). Land tenure in Ghana is generally communal in nature and this has determined the nature of land administration over the years. Dear learner, who owns the land in your communities? Well! Let's identify the various land ownerships among the various ethnic groups in Ghana. To the Northern tribes, land is generally believed to be owned by the "Tendaneena" who are fetish priests. In the Akan states, land is regarded as a feminine spirit, "Asaase Yaa", again, in the Akan states, land is seen as an ancestral trust which must be passed on to succeeding generations, with the chief, being the link between the living and the departed, is the administrator of this heritage. To the Ga states, land is said to be owned by the lagoon gods and its administration is in the hands of the "Wulomei", who are the fetish priests of the lagoon gods. These religious notions of land ownership

have doubtlessly determined the administration and manner of usage of land. To a large extent, these underpinnings have gradually been marginalized or even ignored in the urban economy owing to the growth of urbanisation and its concomitant effects of industrialization, education and Christianity (Asiamah, 1983).

5.2 Type of land tenure system in Ghana

Dear leaner, the 1992 Constitution of the Republic of Ghana recognises two systems of land tenure system. Do you know what a constitution is? Have you ever seen a copy? If no, then get yourself a copy and read. These two types of land tenure systems are the public and customary land tenure systems.

5.2.1 Public land tenure system

Public lands are vested in the President of the Republic of Ghana, on behalf of, and in trust for the people of Ghana based on the relevant provisions of the Administration of Lands Act, 1962, (Act 123). Public lands also include any other land acquired through the State Lands Act, 1962, (Act 125) or through any other statutes, in the public interest. Public lands are administered by the Lands

Commission and its secretariats, as provided in the Lands Commission Act, 1994, (Act 483). Public lands can be grouped into two categories. These are state lands and vested lands. Dear learner, have you come across the definition of state land? Well, take a look at the definition provided. State Land refers to land that the Government has compulsorily acquired for a specified public purpose or in the general public interest by the lawful exercise of its constitutional or statutory power of eminent domain. All previous interests are extinguished and persons who previously held recognizable interests in such lands are entitled by law to compensation either monetary or replacement with land of equivalent value. Laws governing the compulsory acquisition of land by the government include Article 20 of the 1992 Constitution, Administration of Lands Act 1962, (Act 123,) the State Lands Act 1962, (Act 125) the Land Statutory Wayleaves Act 1963, (Act 186) and regulations made under these statutes. Hello learner, we believe you are following the discussion. Now, let us ask you if you have any parcel of land that the government has shown interest in acquiring it.

The second group of public land is vested lands. This is a unique situation brought about by statutory intervention where the landowner retains the customary land ownership but the management of the land is taken over by the state in trust for the owners. The management responsibilities cover legal (e.g. prosecution), financial (e.g. rent assessment, collection, disbursement) and estate management (e.g. physical planning and its enforcement and administration of the property). Vested lands are administered under the Administration of Stool Lands Act, 1962 (Act 123) and the Lands Commission Act, 2008 (Act 767).

5.2.2 Customary Lands

Customary lands are lands owned by stools, skins, families and clans usually held in trust by the chief, head of family and clan or fetish priests for the benefit of members of that group. Section 36 (8) of the 1992 Republican Constitution of Ghana recognises customary ownership of land. Private ownership of customary land can be acquired by way of a grant, sale, lease, gift or marriage. Ownership is by way of outright purchase from customary land owners or private individuals. Customary lands support the livelihoods of the

majority of the population in the country and therefore sustainable management of such lands is critical to the overall socio-economic development of the country.

Hello learner, we have come to the end of session five. In this session we discussed land tenure system. We said that land tenure system denotes the system of landholding, which has evolved from the peculiar political and economic circumstances, cultural norms and religious practices of a people regarding land as a natural resource, its use and development. We also said that in Ghana, land tenure in Ghana is generally communal in nature and this has determined the nature of land administration over the years.

SESSION 6: FRAMEWORK FOR LAND MANAGEMENT AND ADMINISTRATION IN GHANA

You are welcome to the last session of unit 3. In this session, we shall pay our attention to two major issues. These are the frameworks for land management and administration in Ghana. Mention

any one of these frameworks. Now compare your answers to what we have provided below:

Objectives

By the end of the lesson, you should be able to describe the:

1. legal framework for land management in Ghana
2. institutional framework for land administration in Ghana
3. policy framework for land administration in Ghana

Now read on…

6.1 Legal Framework for Land Management

The basic land laws in Ghana are deeply embedded in the socio-cultural systems and political institutions of its indigenous societies, even though they have also been fundamentally influenced by administrative and statutory rules. The legal framework for land administration has developed from colonial times over the years in piecemeal and

in an ad hoc manner, in response to specific issues or political dictates. Currently there are over 86 legal instruments on the statute books some overlapping and others conflicting (Ministry of Lands and Forestry, 2003). These laws operate alongside customary laws in the country, creating a plural legal environment for land administration. Dear learner, we would want you to mention some of these laws. Ok, key among these laws are:

1. Local Government Act, 1993 (Act 462)
2. Town and Country Planning Ordinance of 1945 (CAP 84)
3. Fourth (4th) Republican Constitution of the Republic of Ghana, 1992
4. Administration of Stool Lands Act, 1994 (Act 481) which repealed the Administration of Stool Lands Act, 1962 (Act 123)
5. State Lands Act, 1962 (Act 125)
6. Deeds Registration Ordinance of 1883
7. Land Registry Ordinance of 1895
8. Land Registry Act, 1962 (Act 122)

9. Land Title Registration Law, 1986 (PNDCL 152)
10. Land Title Regulation, 1986 Legislative Instrument (L.I.) 1241.
11. National Development Planning Commission Act, 1994 (Act 479)
12. National Development Planning (Systems) Act, 1994 (Act 480) and the Lands Commission Act, 2008 (Act 767) which repealed the Lands Commission Act,

2000 (Act 483)

Dear learner, it will interest you to know that the institutional framework for land administration in Ghana depicts varied levels and functions. There are currently three (3) ministries and six (6) independent agencies playing various roles in the land sector in Ghana. Name the three ministries. Compare your answers to these. The three ministries are:

a) Lands and Natural Resources

b) Local Government and Rural Development

c) Environment, Science and Technology.

The six (6) land sector agencies currently operating in Ghana are:

a) Lands Commission Secretariat

b) Land Title Registry

c) Survey Department

d) Office of the Administrator of Stool Lands

e) Land Valuation Board

f) Town and Country Planning Department.

6.2 Institutional Framework for Land Administration in Ghana

Dear learner, until February 2009, there were two (2) ministries involved in land administration issues in Ghana namely Ministry of Lands, Forestry and Mines and the Ministry of Local Government, Rural Development. Currently, there are a number of land administration institutions in Ghana. Some of these have been discussed below (Karikari, 2006).

6.2.1 Ministry of Lands and Natural Resources

The Ministry of Lands and Natural Resources is the sector ministry responsible for broad policy formulation, planning and implementation of interventions in the land sector in Ghana. Apart from the Town and Country Planning Department, all the five (5) other land sector agencies report to the ministry in their activities.

6.2.2 Ministry of Environment, Science and Technology

The Ministry of Environment, Science and Technology is responsible for designing and implementing policies and programmes that would improve and maintain congenial environmental conditions in the country. Accordingly, the ministry is also responsible for ensuring orderly physical development in view of their implications on the environment. The ministry provides oversight responsibility for the operations of the Town and Country Planning Department at the national or policy level.

6.2.3 Ministry of Local Government and Rural Development

The Ministry of Local Government and Rural Development is the sector ministry responsible for implementing policies, plans, programmes and project under Ghana's decentralisation programme. The Local Government Act, 1993 (Act 462) mandates Metropolitan, Municipal and District Assemblies as planning authorities responsible for planning the physical development including land use in their respective areas of jurisdiction. The ministry supervises the activities of the Town and Country Planning Department at the implementation level i.e. the regional and district level.

6.2.4 Lands Commission Secretariat

The Lands Department, which was later transformed into the Lands Commission, was first created out of the Lands Section of the Survey Department in 1928. The Lands Department metamorphosed through many stages to become the present Lands Commission. The commission

operated under the Lands Commission Act, 1994 (Act 483) with the advent of the 1992 Republican Constitution. Article 258 (1) of the 1992 Constitution spells out the functions of the Lands Commission to include keeping records of all land transactions. The Regional Offices of Lands Commission Secretariat furnishes the Land Title Registry with records of all transactions on a given land before a land title registration certificate can be granted. Some constraints the Lands Commission Secretariat has to contend with include: inadequate skilled personnel, frequent political interference in its activities, inadequate logistics and support services, poor remuneration and low morale among staff of the commission.

The four divisions of the new Lands Commission are: Public and Vested Lands Management Division; Survey and Mapping Division; Land Valuation Division; and Title Registration Division

6.2.5 Land Title Registry

The Land Title Registry is the outfit established by the Land Title Registration Law, 1986 (PNDC2 Law 152) to provide a machinery for the registration of title to land and interest in land. The

Land Title Registry is legally mandated to compile and maintain a register of title to land. Land Title Registration was introduced to address the weaknesses under deed registration and to put in place a systematic and compulsory registration of all interests in land throughout Ghana. The purpose of title registration is to give certainty to ownership and to facilitate proof of title to make dealings in land safe, simple, cheap and to prevent fraud.

6.2.6 Survey Department

The Survey Department was established in 1901 as part of the Mines Department within the framework of the Colonial Civil Service. It became a fully-fledged department in 1907. The Survey Department is the sole agency responsible for the preparation of parcels of land and boundary demarcations for land title registration.

6.2.7 Land Valuation Board

The Land Valuation Board has no legal instrument that formally establishes it. It operates under Section 43 of PNDC Law 42 (1986). The board is

the government's Valuer. The functions of the Board include assessment of land values for stamp duty as a requirement for issuance of land title registration certificates.

6.2.8 Office of Administrator of Stool Lands

Article 267 (2) of the Fourth (4th) Republican Constitution of Ghana established the Office of the Administrator of Stool Lands. The office is mandated to establish a stool land account for each stool; collect stool land revenue and account for same to the beneficiaries; disburse stool land revenue in accordance with a formula prescribed by the Constitution and to consult with the Lands Commission, stools and other traditional authorities in all declared district and invites all owners to submit their deeds for registration to enable the Registrar of Lands to convert the deeds into titles within 80 days. The Office of the Administrator of Stool Lands does not have adequate skilled manpower to carry out its mandate. The existence of several protracted land disputes and indeterminate boundaries among stools is a major

challenge to the operations of the Office of the Administrator of Stool Lands.

6.2.9 Town and Country Planning Department

The mandate of the department is derived from five (5) legal instruments namely: Local Government Act, 1993 (Act 462), National Development Planning Commission Act, 1994 (Act 479), National Development Planning (Systems) Act, 1994 (Act 480), National Building Regulation, 1996 (LI 1630) and Town and Country Planning Ordinance, 1945 (Cap 84). The Town and Country Planning Department, which is currently one of the decentralized departments under the Metropolitan, Municipal and District Assemblies, is charged with the preparation of planning schemes and setting of planning standards and regulations in Ghana.

6.3 Policy Framework for Land Administration in Ghana

6.3.1 National Land Policy

It was not until 1999 that the Government of Ghana developed for the first time a National Land Policy. The long term goal of the government's land policy is to stimulate economic development, reduce poverty, promote social stability by improving security of tenure, and simplifying the process of accessing land which would make it fair, transparent and efficient and to develop an efficient land market.

6.3.1.1 Objectives of the National Land Policy

Their objectives include ensuring that Ghana's international boundaries are maintained at all times and cross border activities are managed jointly; ensuring that shared water bodies are utilised to the mutual benefit of all stakeholder countries; ensuring that every socio-economic activity is consistent with sound land use through sustainable land use planning in the long-term national interest; facilitating equitable access to and security of tenure of land based on registered titles; protecting the rights of landowners and their descendants from becoming landless or tenants on their own lands; ensuring the payment, within reasonable time, of

fair and adequate compensation for land acquired by government from stool, skin or traditional council, clan, family and individuals; instilling order and discipline into the land market to curb the incidence of land encroachment, unapproved development schemes, multiple or illegal land sales, land speculation and other forms of land racketeering;

6.3.2 National Spatial Development Policy

The National Development Planning Commission is currently coordinating research and policy work on human settlements as an input to the development of the National Development Plan (2006-2015) and thus preparing a National Spatial Development Policy as part of this plan. The National Spatial Development Policy would among others, seek to rationalise land tenure systems and land use planning in Ghana and also address challenges with urbanisation. The policy would also address challenges with urbanisation in Ghana.

6.3.3 Growth and Poverty Reduction Strategy II

Ghana‘s development blueprint over the period 2006-2009 is captured in the Growth and Poverty Reduction Strategy (GPRS) II. A review of the development plan reveals no clear cut policy or programme for land management/land tenure especially within the urban context in Ghana. Rather, issues on land management in the GPRS II relate to reforming the land tenure system with a view to improving access to land for modernising agriculture.

Dear learner, this brings us to the end of unit 6 session 6. We believe you enjoyed reading through the various session of this module. Congratulations. In this session we discussed the legal and institutional framework for land management in Ghana. We also talked about the frameworks used for land administration in Ghana. We mentioned among other things framework such as Local Government Act, 1993 (Act 462), Town and Country Planning Ordinance of 1945 (CAP 84), Fourth (4th) Republican Constitution of the Republic of Ghana, 1992, Administration of Stool Lands Act, 1994 (Act 481) which repealed the

Administration of Stool Lands Act, 1962 (Act 123), and State Lands Act, 1962 (Act 125.

UNIT FOUR: MAPS AND MAPPING SKILLS

Outline

MAPS AND MAPPING OUR ENVIRONMENT

Meaning of a Map

Essential components of Maps

Types of Maps

Importance of Maps

Explanation of Scales

Explanation of Scales

Objectives

By the end of this unit, you should be able to:

1. define a Map

2. discuss three common features of maps
3. examine three types of maps
4. explain three uses of maps
5. identify three limitations of using maps

SESSION 1: Meaning of a Map

Dear learner, you are welcome to this session. In this session, we shall discuss the meaning of land. We shall also trace the origin of maps. We believe that you have been seeing maps on the television and in the newspapers. Well, let's keep on reading and identify more information on maps.

Objectives

By the end of this session, you should be able to:

1. define maps
2. trace the origin of maps

Now, read on…….

1.1 Meaning of a Map

Dear learner, when one draws or represents the whole world or earth or parts of the earth on a piece of paper, then that person has drawn a map. However, this drawing should be done in relation to a particular scale. Thus, a map is a representation of all or part of the earth drawn on a flat surface at a specific scale. It is a symbolic representation of selected characteristics of a place, usually drawn on a flat surface. It presents information about the world in a simple, visual way. It teaches about the

world by showing sizes and shapes of countries, locations of features, and distances between places. Maps can show distributions of things over Earth, such as settlement patterns. They can show exact locations of houses and streets in a city neighborhood. Mapmakers, called cartographers, create maps for many different purposes. Vacationers use road maps to plot routes for their trips. Meteorologists use weather maps to prepare forecasts. City planners decide where to put hospitals and parks with the help of maps that show land features and how the land is currently being used. Maps use a variety of symbols and colours to represent selected features of an area. Maps were devised because they are much easier to use, store, and transport than globes, and they facilitated the development of much larger scaled representations than was the case with a globe.

1.2 Origin of Maps

Hello learners, it is important for you to know that through the ages, maps have taken many different forms and have gone through various stages of development. For instance, the earliest maps were probably sketches made on the ground that showed the surrounding area. People native to the Marshall

Islands used palm fibers to show wave patterns between islands in the Pacific Ocean. They used seashells to represent islands. Inuit fishermen in the Arctic carved pieces of driftwood to show coastal features. One of the world's oldest existing maps was found on a stone tablet in Spain. It dates back nearly 14,000 years.

The ancient Greeks are usually considered the founders of scientific cartography. Greek scholars knew the general size and shape of Earth, and they developed the grid system of latitude and longitude. Eratosthenes, who lived from about 276 to 194 B.C., calculated the size of Earth using mathematics and observations of the sun. Claudius Ptolemaeus, or Ptolemy, was an astronomer, mathematician, and geographer in the second century A.D. He brought mapmaking to a level of precision that would not be seen again until the fifteenth century. He combined all his knowledge about the world into a book called Geography.

In Europe during the Middle Ages, cartographers drew maps reflecting their religious beliefs. These maps were generally simple and sometimes fanciful. The city of Jerusalem, holy to Jews, Christians, and Muslims, was sometimes placed in

the center. Many medieval European maps with Jerusalem at the center are called T & O maps. The mass of land was represented as a round wheel encircled with a single round ocean, the “O” of the T & O. The land encircled by the ocean was divided by a “T” into the three continents known by medieval European cartographers: Asia was the large land mass above the T, Africa and Europe were the two smaller sections on either side of the T, and Jerusalem was at the center. The T-shape splitting the continents was composed of the Mediterranean Sea (between Europe and Africa), the Nile River (between Africa and Asia) and the Don River (between Europe and Asia). The Nile and the Don meet in a single line to form the top of the T.

During these Dark Ages in Europe, Arab scholars kept scientific cartography alive. They preserved the works of Ptolemy and translated them to Arabic. Arab cartographers produced the first reliable globe of the Western world. During the Islamic Golden Age, Arab cartographers used complicated mathematical and astronomical formulas to help them determine different map projections. In 1154, the scientist and cartographer al-Idrisi made a map

of the world that was better than the world maps Europeans were producing. Al-Idrisi's map included a representation of the entire continent of Eurasia, including Scandinavia, the Arabian Peninsula, the island of Sri Lanka, and the Black and Caspian Seas.

In the fifteenth century, cartography in Europe improved. The development of printing and engraving meant maps that had previously been painted by hand could be copied more quickly. Around the same time, sailors began traveling farther on the oceans. They added newly discovered lands and more detailed coastlines to their maps. Explorers brought back descriptions of the interiors, as well as the coastlines, of continents. Europeans explored much of the Americas during the sixteenth century, Australia in the seventeenth century, and Antarctica was finally sighted in the early nineteenth century. At this point, fairly accurate maps of the entire world were beginning to be assembled.

In the nineteenth century, cartography became more advanced with the development of a printing process called lithography. Lithography allowed cartographers to make many accurate copies of

maps with less labor and expense. Photography, color printing, and computers all improved mapmaking even more. In just a few decades, the relationship between people and maps changed drastically. For example, instead of using paper street maps, many people navigate using GPS units that communicate with satellites to determine their exact location on Earth. Digital versions of maps can represent Earth in three dimensions, defying the limitations of the flat maps of the past. Almost the entire surface of Earth has been mapped with remarkable accuracy, and this information is available instantly to anyone with an internet connection.

The role of the Chinese cannot be left out. They were skilled cartographers. The first map was printed in China in 1155 A.D., some 300 years before maps were printed in Europe. It is also important to note at this moment that using images taken from spacecraft, cartographers have created detailed maps of the surfaces of the Moon and Mars. Today, maps are often computerized. Many computerized maps allow the viewer to zoom in and out, changing the scale of the map. A person may begin by looking at the map of an entire city that

only shows major roads and then zoom in so that every street in a neighborhood is visible.

Dear learner, we have come to the end of session one. In this session, we provided the various definitions of maps. We said that when one draws or represents the whole world or earth or parts of the earth on a piece of paper, then that person has drawn a map. However, this drawing should be done in relation to a particular scale. Thus, we defined a map as a representation of all or part of the earth drawn on a flat surface at a specific scale. We finally saw that the earliest maps were probably sketches made on the ground that showed the surrounding area and that one of the world's oldest existing maps was found on a stone tablet in Spain. It dates back nearly 14,000 years.

SESSION 2: ESSENTIAL COMPONENTS OF MAPS

Hello learner, the major focus of this session is to explain the key features of maps. But before that let's ask you this question. Have you come across any map in any of the libraries or social media or the internet? If yes, then what features did you observe on those maps? Well! Compare your answers to what we have provided below.

Objective

By the end of this session, you should be able to:

1. explain three common features of every map

Now, read on …….

1.1 Common Features of Maps

All maps share common properties or map basics that provide information to assist the reader in studying and interpreting the map. These include a title, scale, legend, date of publication, direction, borders, and information about the map projection.

1. **Title**: a map title provides the main idea as to what the map is about. A map titled "Climatic Regions of Ghana' will not contain the same

information as a map entitled “Relief Regions of Ghana”.

2. **Legend or key**: The key or legend contains the meaning of the symbols and color code used on the map.

3. **Scale:** By definition all maps are **scaled**; that is, they are reduced from real-world dimensions to manageable proportions. Scale can be defined as the ratio of the distance between two points on the map and the same two points on the Earth’s surface. Scale can be expressed as a ratio (e.g., 1:50,000), as a line or graphic with labeled distance gradations, or as a verbal statement (1 cm is equivalent to 0.5 km). A large-scale map is one that represents a small portion of the Earth’s surface but shows a great amount of detail. Topographic maps and city street maps are examples of large-scale maps. Small scale maps, on the other hand, represent large portions of the Earth’s surface but are not able to show much detail. Maps showing continents or the entire world are examples of small-scale maps. Maps showing a province or

country could be considered intermediate scale maps. A map's scale indicates the relationship between the distances on the map and the actual distances on Earth. This relationship can be expressed by a graphic scale, a verbal scale, or a representative fraction. The most common type of graphic scale looks like a ruler. Also called a bar scale, it is simply a horizontal line marked off in miles, kilometers, or some other unit measuring distance. The verbal scale is a sentence that relates distance on the map to distance on Earth. For example, a verbal scale might say, "one centimeter represents one kilometer" or "one inch represents eight miles." The size of the area covered helps determine the scale of a map. A map that shows an area in great detail, such as a street map of a neighborhood, is called a large-scale map because objects on the map are relatively large. A map of a larger area, such as a continent or the world, is called a small-scale map because objects on the map are relatively small.

4. **Symbols:** Cartographers use symbols to represent geographic features. For example, black dots represent cities, circled stars

represent capital cities, and different sorts of lines represent boundaries, roads, highways, and rivers. Colors are often used as symbols. Green is often used for forests, tan for deserts, and blue for water. A map usually has a legend, or key, that gives the scale of the map and ex plains what the various symbols represent. Some maps show relief or changes in elevation. A common way to show relief is contour lines, also called topographic lines. These are lines that connect points that have equal elevation. If a map shows a large enough area, contour lines form circles. A group of contour line circles inside one another indicates a change in elevation. As elevation increases, these contour line circles indicate a hill. As elevation decreases, contour line circles indicate a depression in the earth, such as a basin.

5. **Grids:** Many maps include a grid pattern, or a series of crossing lines that create squares or rectangles. The grid helps people locate places on the map. On small-scale maps, the grid is often made up of latitude and longitude lines. Latitude lines run east-west around the globe, parallel to the Equator, an imaginary line that

circles the middle of the Earth. Longitude lines run north-south, from pole to pole. Latitude and longitude lines are numbered. The intersection of latitude and longitude lines, called coordinates, identify the exact location of a place. On maps showing greater detail, the grid is often given numbers and letters. The boxes made by the grid may be called A, B, C, and so on across the top of the map, and 1, 2, 3, and so on across the left side. In the map's index, a park's location might be given as B4. The user finds the park by looking in the box where column B and row 4 cross.

6. **Projection**: It is a way, or system of showing the round on a map which is flat. All map projections distort the earth's surface in some way.

7. **Direction**: Devices such as compass rose or directional arrows are to indicate north or some other direction. If one direction is shown all other directions can be inferred from it.

8. **Authorship**: It indicates the maker or makers of the map.

Dear learner, in this session, we discussed the various features of maps. We identified that every map has a scale, key or legend, date in which the map was drawn as well as the title of the map and the cardinal points.

SESSION 3: TYPES OF MAPS

You are welcome to this session. In this session, we shall look at the various types of maps. Dear learner, do you know that maps can be drawn for different purposes? Well! The differences in purposes have given rise to different types of maps. Now, mention any two types of maps you know. Compare your answers to what we have discussed below.

Objective

By the end of this session, you should be able to:

1. explain three types of maps

Now read on……

3.1Types of Maps

Maps can be classified into various types. The commonest classification includes the following:

Types of Maps Based on Scale: On the basis of scale, maps may be classified into large-scale and small-scale. Large scale maps are drawn to show small areas at a relatively large-scale. For example, the topographical maps drawn at a scale of 1: 250,000, 1:50,000 or 1:25,000 and the village maps, the zonal plans of the cities and house plans prepared on a scale of 1:4,000, 1:2,000 and 1:500 are large scale maps. On the other hand, small-scale maps are drawn to show large areas. For example, atlas maps, wall maps, etc. (i) Large-scale Maps: Large-scale maps are further divided into the following types: (a) Cadastral maps (b) Topographical maps.

(a) Cadastral Maps: The term 'cadastral' is derived from the French word 'cadastre' meaning 'register of territorial property'. These maps are drawn to show the ownership of landed property by demarcating field boundaries of agricultural land and the plan of individual houses in urban areas. The cadastral maps are prepared by the government agencies to realise revenue and taxes, along with keeping a record of ownership. These maps are drawn on a very large scale, such as the cadastral maps of villages at 1: 4,000 scale and the city plans

at a scale of 1 : 2,000 and larger. **(b)** Topographical Maps: These maps are also prepared on a fairly large scale. The topographical maps are based on precise surveys and are prepared in the form of series of maps made by the national mapping agencies of almost all countries of the world (Chapter 5). For example, the Survey of India undertakes the topographical mapping of the entire country at 1: 250,000, 1: 50,000 and 1: 25,000 scale (Fig. 1.3). These maps follow uniform colours and symbols to show topographic details such as relief, drainage, agricultural land, forest, settlements, means of communication, location of schools, post offices and other services and facilities. (ii) Small-scale Maps: Small-scale maps are further divided into the following types: (a) Wall Maps (b) Atlas Maps (a) Wall Maps: These maps are generally drawn on large size paper or on plastic base for use in classrooms or lecture halls. The scale of wall maps is generally smaller than the scale of topographical maps but larger than atlas maps. (b) Atlas Maps: Atlas maps are very small-scale maps. These maps represent fairly large areas and present highly generalised picture of the physical or cultural features. Even so, an atlas map serves as a graphic

encyclopaedia of the geographical information about the world, continents, countries or regions. When consulted properly, these maps provide a wealth of generalised information regarding location, relief, drainage, climate, vegetation, distribution of cities and towns, population, location of industries, transport-network system, tourism and heritage sites, etc.

Types of Maps Based on Function: The maps may also be classified on the basis of their functions. For example, a political map serves the function of providing administrative divisions of a continent or a country and a soil map shows the distribution of different types of soils. Broadly, maps based on their functions may be classified into physical maps and cultural maps. (i) Physical Maps: Physical maps show natural features such as relief, geology, soils, drainage, elements of weather, climate and vegetation, etc. (a) Relief Maps: Relief maps show general topography of an area like mountains and valleys, plains, plateaus and drainage. (b) Geological Maps: These maps are drawn to show geological structures, rock types, etc. (c) Climatic Maps: These maps depict climatic regions of an area. Besides, maps are also drawn to

show the distribution of temperature, rainfall, cloudiness, relative humidity, direction and velocity of winds and other elements of weather. (d) Soil Maps: Maps are also drawn to show the distribution of different types of soil(s) and their properties.

(ii) Cultural Maps: Cultural maps show man-made features. These include a variety of maps showing population distribution and growth, sex and age, social and religious composition, literacy, levels of educational attainment, occupational structure, location of settlements, facilities and services, transportation lines and production, distribution and flow of different commodities. (a) Political Maps: These maps show the administrative divisions of an area such as country, state or district. These maps facilitate the administrative machinery in planning and management of the concerned administrative unit. (b) Population Maps: The population maps are drawn to show the distribution, density and growth of population, age and sex composition, distribution of religious, linguistic and social groups, occupational structure of the population, etc. Population maps serve the most significant role in the planning and development of an area. (c) Economic Maps: Economic maps depict

production and distribution of different types of crops and minerals, location of industries and markets, routes for trade and flow of commodities.

In this session, we classified maps based on scale and on function. Based on scale we discussed cadastral maps and topographical maps and cited examples such as wall maps, atlas Maps whilst based on function we saw physical maps such as relief maps, political and economic maps.

SESSION 4: IMPORTANCE OF MAPS

Dear learner, we use this opportunity to welcome you to this session. In this session, we shall discuss the main uses of maps. Name any three uses of maps that you know. Compare your answers to the answers we have provided in this session.

Objective

By the end of the lesson, you should be able to

1. outline three uses of maps

Now read on……..

5.1 Importance of Map

In general maps are one of the most important tools researchers, cartographers, tourists, students and others can use to examine the entire earth or a specific part of it. In simple words, maps are pictures of the earth's surface. They can be used as general reference to show landforms, political boundaries, water bodies, and the positions of cities. A map gives a minute depiction of a very large space. It acts as a guide in places which we have never visited before. They give us the distance in two places, mountains, rivers, railway station, airport, and shapes of places or destinations. Dear learner, it is important to note that maps have several uses. However, the relevance of maps depends on a particular type of map. This is because not all maps serve the same purpose. Every map has its own relevance. In this regard, let us look at the various maps and their specific uses.

5.1.1 Maps are used to show state and national boundaries of a place. For example, political maps. They show the locations of cities – both large and small, depending on the detail of the map. A common type of political map would be World Atlas. They also show landforms like deserts,

mountains and plains. Their topography style presents an overall better picture of the local terrain.

5.1.2 Maps are also used to show rivers and lakes and water bodies with blue color. An example is physical maps. Mountains and elevation changes are usually shown with different colors and shades to show relief. Normally on physical maps green shows lower elevations while browns show high elevations.

5.1.3 Maps are also used to show both natural and man-made features. For instance, topographic map is published as a map series which is made up of two or more map sheets that combine to form **the whole map. Dear learner, mention any two natural and two man-man features you know.**

5.1.4. Maps are also used to show the geographic distribution of the monthly or annual average values of climatic variables such as temperature, precipitation, relative humidity, percentage of possible sunshine, isolation, cloud cover, wind speed and direction, and atmospheric pressure over regions ranging in area from a few tens of square kilometers to global breadth. This is the climate map.

5.1.5 Maps are used to show the specific type of economic activity or natural resources present in an area. This is shown through the use of different symbols or colors depending on what is being shown on the map. An example is **Economic Map** which shows branches of various production spheres. These maps are concerned with the trade, commerce, transport of goods, economic conditions etc. of a country, a state or a city. These maps also show unemployment, energy resource usage, banking and commerce, and world trade.

5.1.6 Maps also show major and minor highways and roads in details, as well as spots like railway station, airports, city locations and points of interest like parks, campgrounds, temples, churches and monuments. Dear learner, name the type of map that shows the above features. Well done if your answer was road maps. A road map is one of the most widely used map types. Major highways on a road map are generally red and larger than other roads. Minor roads are a lighter color and a narrower line. A r**oad map** primarily displays roads and transport links. It also shows political boundaries and labels, making it also a type of political map.

5.1.7 Maps do not just show natural features like rivers, cities, political subdivisions, elevation and highways. If these items are on a thematic map, they are background information and are used as reference points to enhance the map's theme.

Dear learner we have come to the end of this session. In this session we identified the various uses of the various map types. We pointed out that maps are used to show political boundaries, natural and man-made features, highlands and lowlands, highways etc. We believe that you can add more uses of maps.

SESSION 5: EXPALNATION OF SCALES

Dear learner, in this session, we shall discuss the scale of a map. We know that all maps are reductions. The first decision that a map-maker has to take is about the scale of the map. The choice of scale is of utmost importance. Give any reason to explain this view. Well! Keep on reading, the answer has been provided below.

Objectives

By the end of the lesson, you should be able to

1. describe the scale of a map
2. identify three different ways of stating the scale of maps
3. convert scale from one form to another form
4. measure distances and areas in a straight line

Now, keep on reading…..

4.1 Scale of a Map

The scale of a map sets limits of information contents and the degree of reality with which it can be delineated on the map. To be most useful, a map must show locations and distances accurately on a sheet of paper of convenient size. This means that everything included in the map ground area, distance, rivers, lakes, roads, and so on must be shown proportionately smaller than it really is. The proportion chosen for a particular map is its scale.

Large Is Small

Simply defined, scale is the relationship between distance on the map and distance on the ground. A map scale might be given in a drawing (a graphic scale), but it is usually given as a fraction or a ratio- 1/10,000 or 1:10,000. These "representative fraction" scales mean that one unit of measurement

on the map 1 inch or 1 centimeter represents 10,000 of the same units on the ground. If the scale were 1:63,360, for instance, then 1 inch on the map would represent 63,360 inches or 1 mile on the ground (63,360 inches divided by 12 inches = 5,280 feet or 1 mile). The first number (map distance) is always 1. The second number (ground distance) is different for each scale; the larger this second number is, the smaller the scale of the map. "The larger the number, the smaller the scale" sounds confusing, but it is easy to understand. A map of an area 100 miles long by 100 miles wide drawn at a scale of 1:63,360 would be more than 8 feet square! To make this map a more convenient size, either the scale used or the amount of area included must be reduced. If the scale is reduced to 1:316,800, then 1 inch on the map represents 5 miles on the ground, and an area 100 miles square can be mapped on a sheet less than 2 feet square (100 miles at 5 miles/inch equals 20 inches, or 1.66 feet). On the other hand, if the original 1:63,360 scale is used but the mapped area is reduced to 20 miles square, the resulting map will also be less than 2 feet square. Such maps would be much handier. But would they be more useful? In the small-scale map (1:316,800),

there is less room; therefore, everything must be drawn smaller, and some landmarks must be left out altogether. On the other hand, the larger scale map (1:63,360) permits more detail, but it also covers much less ground. Many areas have been mapped at different scales. When choosing a map, that is, when choosing a scale the most important consideration is its intended use. A town engineer, for instance, may need a very detailed map in order to precisely locate house lots, power and water lines, and streets and alleys in a community. A commonly used scale for this purpose is 1:600 (1 inch on the map represents 50 feet on the ground). This scale is so large that many features such as buildings, roads, railroad tracks that are usually represented on smaller scale maps by symbols can be drawn to scale.

4.2 Different ways of Stating Scales

Scale of maps can be expressed in three ways. It may be expressed as a statement, for the example, one centimeter to one kilometer, or as a representative fraction, for example, 1/50000 (which can also be written as 1:50000), or as a linear scale which is in line divided into several equal

parts showing that each division represents a certain distance on the ground.

4.2.1 Statement scale

It is the expression of the scale, that is, the relationship between the distance on the map and the actual distance on the ground in words. For example, one centimeter to one kilometer or 1cm to 1km. This means 1cm on the map represents 1km on the ground. The statement scale is advantageous in several ways because it is self-explanatory hence it is quite easily understood by a lay person.

4.2.2 Representative fraction

It is the expression of the scale of a map in a fraction or ratio form whose numerator is always 1. For example, 1:50000. This type of scale is international in scope as it is universally applicable to any system of management. It requires conversion from a given representative fraction (R.F) before it becomes meaningful. This entails some mathematical calculations.

4.2.3 Linear Scale

This is the relationship between the distance on the map and the actual distance on the ground

expressed in a line form and conveniently divided into lengths to make it easy to measure distances on the map.

4.3 Converting statement scale into representative fraction

Change 1 cm to 1 km into R.F.

1 cm to (1× 100000) (note 100000cm=1km)

R. F= 1:100000

Change 4cm to 1km into R.F

4cm to (1 ×100000cm)

4cm to 100000cm

4cm/4 to 100000cm/4

1cm to 25000cm

R. F= 1:25000

Convert 2.5cm to 1km into R.F

2.5cm to (1×100000cm)

2.5cm×2 to (100000cm × 2)

5cm to 200000cm

5cm/5 to 200000cm/5

1cm to 40000cm

R. F= 1:40000

Convert 2cm to 1km into R.F

2cm to (1×100000cm)

(2cm/2) to (100000/2)

R. F=1:50000

Converting representative fraction into statement scale

Express 1:250000 as a statement scale

1cm to 250000cm

1 cm to 250000km/100000

1cm to 2.5km

Express 1:50000cm as statement scale

1 cm to 50000cm

1 cm to (5000/10000)

1 cm to 1/2 km

(1 cm × 2) to ½ km × 2

2cm to 1km

Change 1:25000 into a statement scale

1 cm to 25000cm

1 cm to 25000km/100000

1cm to ¼ km

(1 cm × 2) to ½ km × 4)

4cm to 1km

4.4 Measurement of distances and areas: measuring distance's in a straight line

This merely necessitate straight measurement with a rule or a straight edge and laying it against the linear scale to read of the distance or calculating the distance using the statement scale or R.F

Measuring curve distances

To measure curved distance that is not straight for example a road, railway, or a river, the following methods may be used.

1. Measure with a piece of thread.
    a. Lay piece of thread along the line to be measured following the curve carefully.
    b. Mark the ending points of the thread and lay it against the linear scale to read off the

distance or calculate the distance using the statement scale.

2. Measure with a piece of paper
    a. Divide the line to be measured into sections that are fairly straight by using a sharp pencil.
    b. Lay the straight edge of the paper of the paper on the first stretch of the line and mark the first bend.
    c. Turn the paper until it fits along the second straight section and
    d. Repeat the process until you come to the marked end of the line.
    e. Use the linear scale to read off the distance or scale, or calculate the distance using the statement scale or R.F.
3. Measure with a pair of dividers
    a. Divide the line to be measured into fairly straight sections using sharp pencils marks.
    b. Step off carefully with a pair of dividers each of the sections and mark those in succession on a straight edge of a sheet of paper.

c. Measure the total stretch of the line on a linear scale, or calculate the distance using the statement scale or R.F.

4. Measurement of irregular areas

Measurement of irregular areas can be done only approximately. This can be done by:

(i) The square method in which the area is traced onto a square graph paper and then the traced area divided into small squares of some convenient unit areas, such as one square kilometre but depending

In sum, three types of scales of maps could be identified. These are statement scale, representative fraction, and linear scale. Statement scales are stated in statement form, representative fractions are presented in ratio form whilst linear scales are presented in a form of line.