SIMPLIFIED GEOGRAPHY

STATISTICS

PRACTICE BOOK

FOR

ORDINARY LEVEL

Essentials skills

In

Geography statistical methods

Second edition 2022

GEOGRAPHY STATISTICAL METHODS

INTRODUCTION

When you read a newspaper, magazine, ministerial reports or text books you come across figures showing total population, export earnings from crops like coffee, Tea or rainfall and temperature figures for different parts of the country. Such figures are called statistics.

Statistics is a branch of Geography which deals with the collection of numerical information called data. After collection, the information may need to be arranged in a systematic manner. It may need to be presented in a suitable form which is for everyone to understand.

Some of the uses of statistics in Geography include;

- It enables the user to know the exact value of phenomenon we are dealing with e.g. population growth rate of Uganda.
- It enables the user to compare Geographical phenomena.
- It can be used to show relationship between phenomena such as temperature and rainfall
- It is important in showing changes in time such as population size, export earnings, agricultural production etc.
- It is also very essential for planning purposes especially government programme.

Important aspects to take note when constructing statistical graphs and diagrams

- A statistical graph or diagram must be tidy and neat i.e. pleasing to look at.
- There must be careful choice of symbols, colours, form of shading and choice of statistical method to stress important points in the data.
- The most efficient and suitable graph or diagram must be chosen for a particular statistical data.
- When drawing statistical graphs and diagrams one should use the following equipment; ruler, pencil, a pair of compass, dividers protractors and a graph paper.
- Any written information on a statistical graph or diagrams should be dene horizontally for easy reading.
- Continuous practice is vital in acquiring the practical skills and techniques of statistical representation.
- Statistical methods involving calculations such as percentages, degrees, population etc. their workings must be shown clearly and must have units.

Classification of statistical methods

1- Statistical graphs

This group basically deals with the relationship between quantities. Their representation usually requires a background of a squared graph paper. The horizontal and vertical axes form a basic and integral part of the drawing.

At this level we shall look at;

- The line and curve graphs
- Multiple line graphs
- The bar graphs
- Comparative bar graph
- Tire bar and line graphs

LINE AND CURVE GRAPHS

These are used to represent statistical information which depicts changes of phenomenon overtime. This may include Temperature changes, population trends, variations in crop production etc.

When drawing a line graph the points plotted are joined by a series of straight line. In cases where continuity has to be emphasized such as temperature, the points are joined by a smooth rounded curve.

Procedure to note when constructing line /curve graph
- The horizontal axis is used to represent the independent variables i.e. time which may be months, years or any other period of time.
- The vertical axis is used to represent the dependent variables i.e. which may include quantities or values and sometimes percentages.
- The base of the vertical scale should start at zero while the top should be slightly higher than the maximum value to be recorded on it.
- It's preferable to draw two vertical axes one at each end of the horizontal axis to ease the plotting and reading of values.
- When plotting, the dots are best placed in the middle of the space between the vertical values.

N.B:-
- The dots should be light and avoid using stars
- Avoid indicating large numbers e.g. 1,000,000 to avoid congestion, instead write either at the top or along the side the value of the units expressed in figures like '000', '000000' tones.
- The line should not touch the two vertical axes.

Example

Study the table below showing E. Africa's total population in millions (1994 – 2001) and answer the questions that follow.

Year	1994	1995	1996	1997	1998	1999	2000	2001
Population (000,000)	73	76	78	80	82	84	86	88

Adapted: World Bank (2003) African development indicates Washington DC. P6

i.   Draw a line graph to show the trend of population growth in East Africa.

Before you start drawing a line graph you must have a graph paper. When using a graph paper one must plan well in order to present neat work.

To do this you must use a suitable vertical and horizontal scale. Here is a simple way on how to get a suitable scale to represent the information in the table above.
- Identify the highest value in the table.
- Choose the vertical height you wish the vertical axis should have Say 17cm.
- You continue and state that

  17cm rep 88 (000,000) (highest value in table)

  lcm rep X

  You cross multiply

$$\frac{17x}{17} = \frac{88}{17}$$

X   =   5.2 we round off to 5
Hence 1cm rep 5 (000,000) people
Vertical scale: 1cm rep 5 (000,000) People
Horizontal scale: 2cm rep 1 year

To ease the plotting on the vertical axis we divide 5 with all values and units we get, we simply use a centimeter ruler to plot them.

This is illustrated below

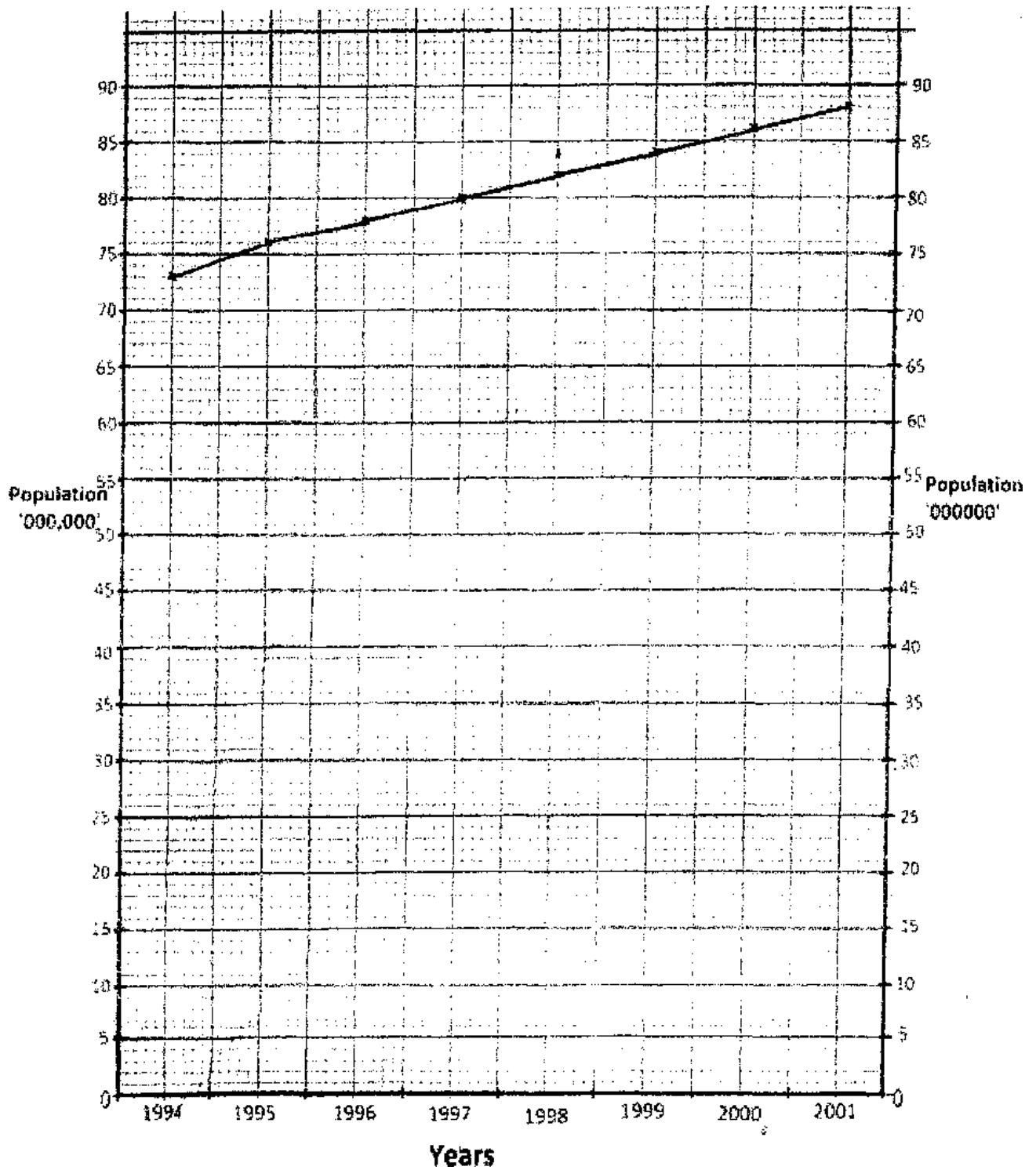**East Africa: Total Population ("000,000") 1994-2001**

YEAR	1994	1995	1996	1997	1998	1999	2000	2001
POPULATION "000,000"	73	76	78	80	82	84	86	88
(cm) PLOT VALUES	14.6	15.2	15.6	16	16.4	16.8	17.2	17.6

A LIME GRAPH SHOWING EAST AFRICA'S TOTAL POPULATION FROM 1994 TO 2001

Scale:
V,S = 1cm rep 5 (000000)people
H,S - 2cm rep 1 year

Population '000,000'

Population '000000'

Years

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(iii) Calculate the percentage change in East Africa's total production between 1994 and 2001.

$$= \frac{New - old}{old} \; x \; 100$$

$$= \frac{88 - 73}{73} \; x \; 100$$

$$= \frac{15}{73} \; x \; 100 = 20\%$$

(ii) Explain the factors which have led to the population change in b (i) above.

N.B:-

- This question requires one to determine the nature of change and explain the reasons for the nature of change.
- The explanations should reflect an aspect of change with the help of words like unproved, increase/decrease.

The change according to b (i) is an increase in population so the following points may be considered.

- improved medical care which has led to reduction of infant mortality rates.
- Increase m food production and improved nutrition which has improved the health hence rising the life expectancy.
- The higher numbers of women than men yet all women married or not are interested in many children.
- Limited family planning education and facilities which leads to high birth rates.
- Increased political stability which has led to an influx of foreigners inform of refugees.
- Increased influence of religions which encourages family development and are opposed to use of contraceptives.
- Increased polygamy tendencies which lead to large families as all wives give birth.
- Increased early marriages which lead to a long reproductive period in which they bear many children.

Example 2

Study the table below showing Uganda's tourist earning in US million dollars from 1990 to 1995 and answer the questions that follow:

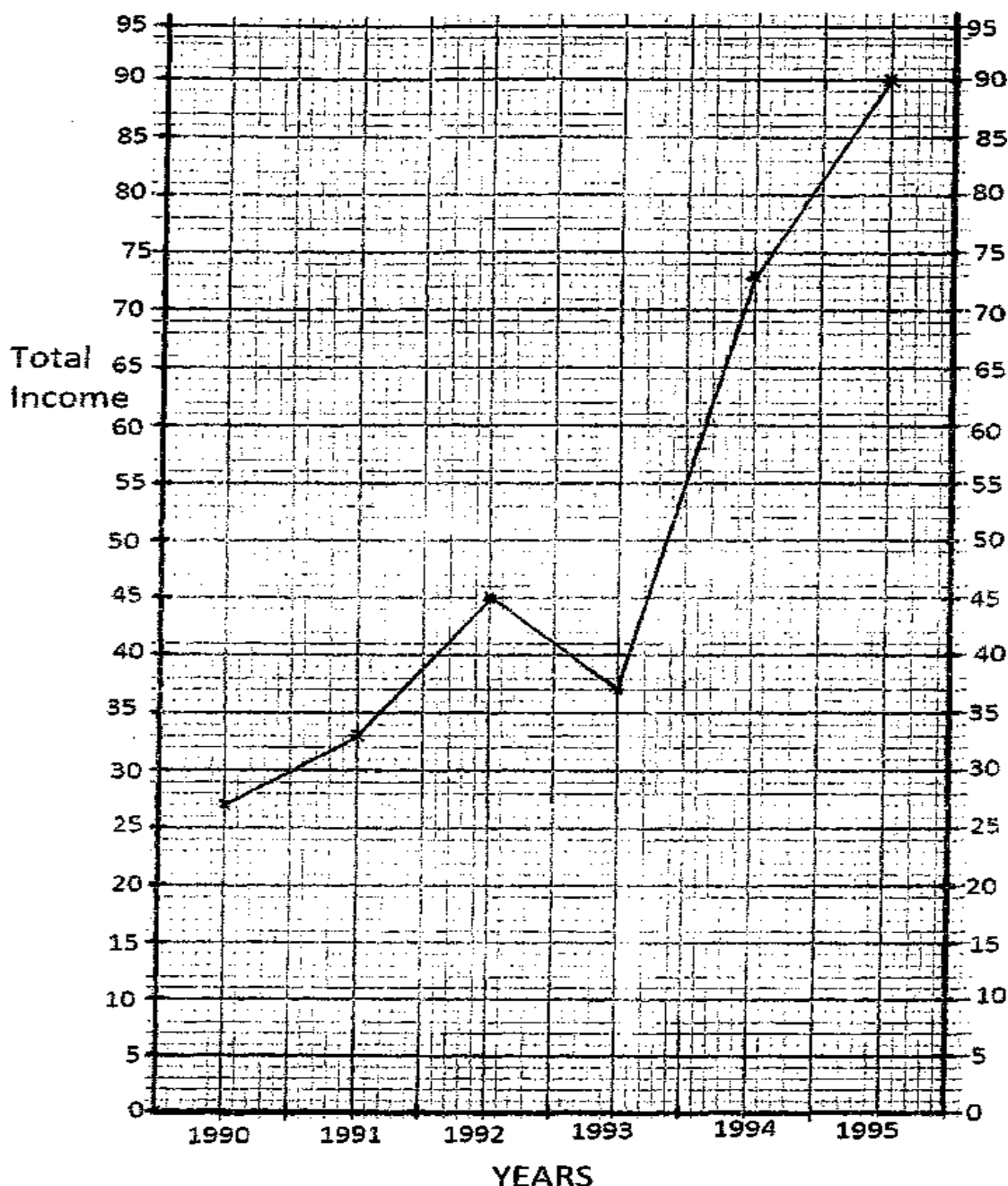**Table2: Uganda's tourist earning in US million dollars. (1990 — 1995)**

Years	1990	1991	1992	1993	1994	1995
Total income (US million dollars)	27	32	45	37	73	90

a) Draw a line graph to show the information given in the table below.

A LINE GRAPH SHOWING UGANDA'S TOURIST EARNING IN US MILLION DOLLARS (1990 - 1995)

SCALE:

V.S: 1cm rep 5 US million dollars

H.S: 2cm rep 1 year

(b) (i) Calculate the percentage change of Uganda's tourism earning between 1990 and 1995

$$= \frac{New - old}{old} \ x \ 100$$

$$= \frac{90 - 27}{27} \ x \ 100$$

= 233.3%

(ii) Describe the trend of Uganda's tourist earnings from 1990 to 1995.

Trend: This is the pattern of change in variables over time.

Approach:-

This type of question is answered using words like slight, steady, sharp increase or decrease in a given variable. Words like high, sudden, rapid, small, big, slow, can also be used to describe the change in the variable.

Let us take the example: question above.

- There was a steady increase in tourism earnings from 1990 to 1992.

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- There was a slight decline in tourism earnings from 1992 to 1993.
- There was sharp increase in tourism earnings from 1993 to 1994.
- There was steady increase in tourism earnings from 1994 to 1995.

(iii) Explain the factors responsible for the nature of the trend described above.

As noted from above there was a decrease and increase in tourism earnings hence when answering the above question we should explain the reasons for the decrease and those for the increase.

Reasons for decrease
- There may have been an outbreak of deadly diseases like Ebola which threatened away foreign tourists.
- There could have been political instability and insecurity which threatened away foreign tourist.
- There may have been a decline in the amount of capital invested in the tourism sector.
- There may have been stiff competition from neighbouring countries reducing on the number of tourist.

Reasons for increase
- Restoration of political stability which helped to secure the country hence easily attracting foreign tourist.
- Increased advertisement of Uganda's tourist attraction abroad through the media like magazines.
- Improvement of transport and communication network easing accessibility to Uganda and its tourist attractors.
- Improved accommodation facilities in form of hotels, camping sites which provide international standard services to foreign tourists.
- Increased investment in tourist infrastructure like hotels promoting tourism.
- Supportive government policy in form of inviting local and foreign investors to invest in the tourism activities.
- Existing variety of tourism attractions able to attract a number of foreign tourists.
- Improvement in the hospitality of most tribes who welcome visitors.
- Improvement in skilled and semi-skilled man power who offer excellent services to the people.

Exercises

1. Stud the table showing Zimbabwe's exports of manufactured goods. (1996 - 2001)
Table3: Zimbabwe's exports of manufactured goods (1996 - 2001)

Year	Export (in 000 US)
1996	846,000
1997	900,000
1998	655,000
1999	640,000
2000	567,000
2001	552,000

a) Draw a line graph to represent the information given in the table above.
b) Describe the:-
   i) Trend of the export of manufactured goods in Zimbabwe.
   ii) Conditions which have led to the trend in b (i) above.

2. Study the table below showing iron-ore production and consumption in China between 1980 - 1994 and answer the questions that follow:

Table 4.Production and consumption in '000' metric tons.

Year	Iron ore production	Iron ore consumption
1980	68,072	120,394
1985	80,000	140,354
1990	168,300	193,471
1995	234,660	222,771

(a)   Draw a line graph to show annual iron-ore production between 1980 and 1994.

(b)   Describe:

i.   Trend of Iron ore production.

ii.   The conditions responsible for the trend.

iii.   Relationship between production and consumption between 1980 and 1995.

2.   Study the table below showing copper production in Zambia and answer the questions that follow.

Table5: Zambia: Copper production 1975 - 1990 (000 metric tons)

Year	Annual production ('000's metric tons)
1975	676.9
1980	565.8
1985	452.6
1990	445.0

Source: World resources: A guide to Global. Environment 1992 - 1993: Toward sustainable development oxford P. 320.

(a)   Draw a line graph to show the information given in the table.

(b)   (i) Describe the trend of copper production in Zambia between 1975 and 1990.

(ii) Explain the factors which have contributed to the trend in b (i) above.

4.   Study table 1 below showing population growth in Nigeria (1994 - 2001) and answer the questions that follow:

Table 6: Nigeria's population growth (1994 - 2001)

Year	Population ('000' people)
1996	114,500
1997	117,680
1998	120,820
1999	123,900
2000	126,910
2001	129,870

Adopted: 2003 African development indicators, the wood bank is P6

a) Draw a line graph to show the information contained in the table.

b) Describe the trend of population growth in Nigeria between 1994 and 2001.

c) Explain the conditions which have led to the trend of population growth described in (b) above.

5.   Study the table provided below showing natural forest cover in East Africa and answer the questions that follow:

Table 7: East Africa: Area under forest cover (000s ha)

Country	1980	1990	2000
Kenya	1,400	1,300	1,200
Tanzania	38,000	34,000	32,000
Uganda	7,000	6,400	6,100
East Africa	46,400	41,700	39,300

Adopted: World resources (1998 - 1999): A Guide to the Global environment; WRL, Word Bank P.292

a) Draw a line graph to show the trend of forest cover destruction in East Africa between 1980 and 2000.

b) (i) Calculate the percentage change in the area under forest cover for *ach country shown in the table between 1980 and 2000.

(ii) Name the country in East Africa which has experienced the:-

- Highest
- Lowest

Rate of forest cover destruction between 1980 and 2000.

MULTIPLE LINE GRAPHS

This is also a line graph however this type of graph involves the drawing of more than one line graph on the same set of axes. This type of graph is used to represent multiple data on one graph.

It is very useful for comparing different variables and because of this it is also referred to as a comparative or group line graph.

When drawing a multiple line graph, the points plotted are joined by a series of straight lines.

Procedures to note when constructing multiple line graphs

❖ The horizontal axis is used to represent the independent variables, i.e. time which may be months, years, or any other period of time.

❖ The vertical axis is used to represent the dependent variables, i.e. which may include quantities, or values and sometimes percentages.

❖ The base of the vertical scale should start at zero since the value of each individual component is calculated from the zero line.

❖ After choosing a suitable scale, plot the points of the various variables one at a time.

❖ Draw different kinds of lines as u join the points of each variable to distinguish them from each other. Different colours of lines may also be used.

❖ Simple writings can be done on each line for easy identification but should not exceed two words per line.

NB:

- Drawing of too many lines on the graph should, be avoided at most they can he four or five lines.

- Where possible, the lines should not cross each other.

Example 1

Study the table below showing principle crops of United Kingdom in "000" acres from 1963 to 1967

Table 8

Crops	1963	1964	1965	1966	1967
Wheat	1928	2206	2535	2238	2308
Barley	4713	5032	5365	6130	6027
Oats	1295	1125	1014	907	1012

Source: A practical guide to statistical graphs and diagrams by H. C Truranpg 7

a. Draw a multiple line graph to show crop production in the UK from 1963 to 1967 Before you start drawing a multiple line graph, you must have a graph paper which you must plan well for in order to present neat work.

To do this, you must use a suitable vertical and horizontal scale and here is a simple way o how to get a suitable scale to represent the information in the table above.

- Identify the highest value in the table.

- Choose tile vertical height you wish the vertical axis should have say, 15cm.

- You continue and state that;

- 15cm rep 6130(000) acres
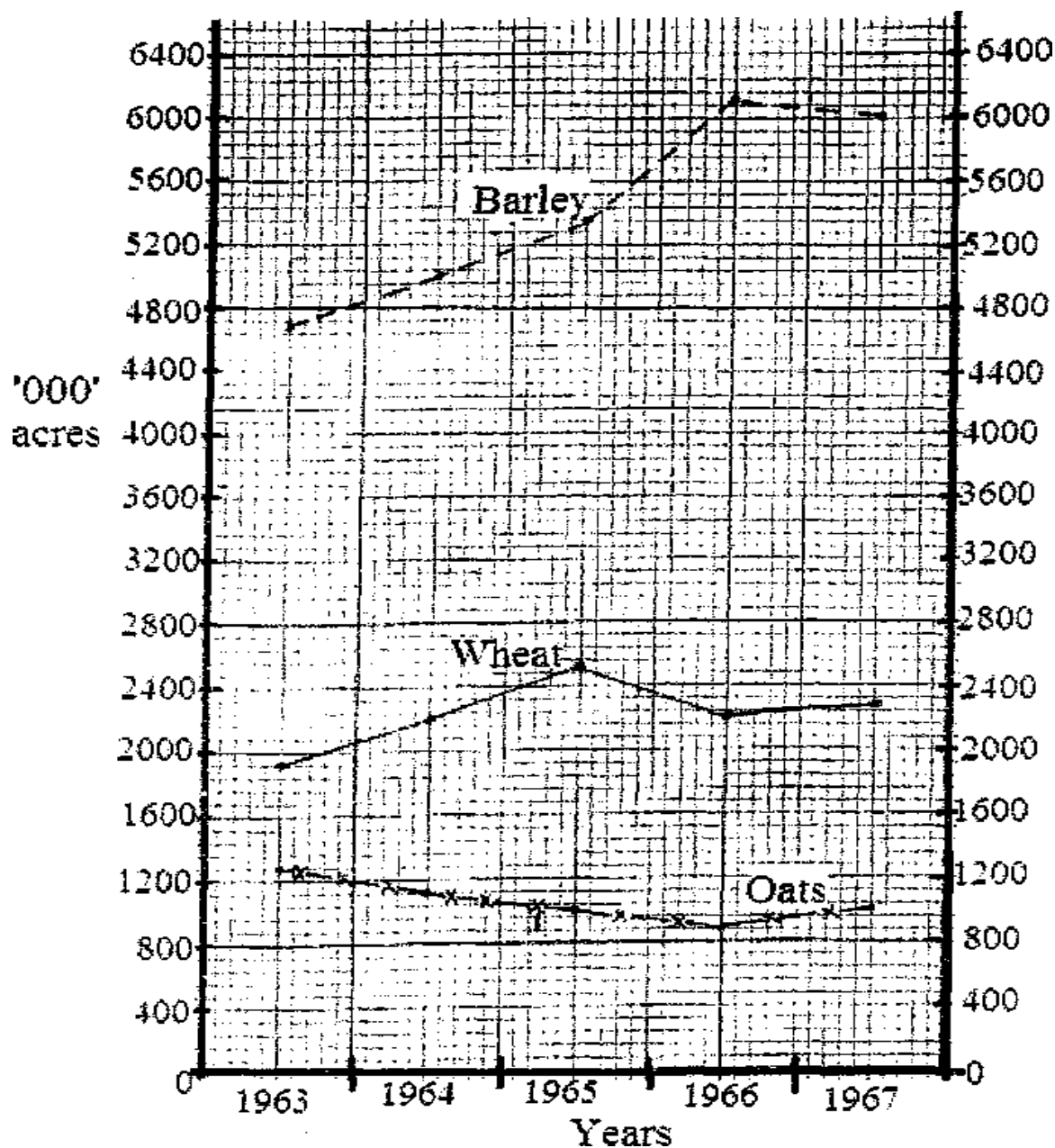
- lcm rep x

$$\frac{15X}{15} = \frac{6130(000)}{15}$$

X = 408.7(000)

We can conveniently state that:

X = 400(000)

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Hence 1cm rep 400(000) acres

A MULTIPLE LINE GRAPH SHOWING PRINCIPLE CROPS OF UNITED KINGDOM FROM 1963 TO 1967

Exercises

1. Study the table showing the estimated number of vehicles on the road in Uganda from 1971 to 1993 and answer the questions that follow.

Table 9:

Years	Pickups	Buses	Min buses	Cars
1971	4988	903	665	23771
1981	3689	875	620	10656
1991	9014	528	3391	12865
1993	15035	401	6489	20464

Source: Adopted from quarterly economic report. BOU vol. 02/1994 appendix 49 Question

a) State the most used vehicles between 1971 to 1993
b) Draw a multiple line graph to represent the information in the table.2

2. Study the table below showing changes in forest cover for selected countries in Africa between 1990 to 2010 and answer the questions that follow.

Forested *area* as percentage of total land area *Table 10:*

Country	1990	2000	2010
Gabon	85.4	85.4	85.4
DRC	70.7	69.4	68.0
Rep of South Africa	6.8	5.7	4.7
Liberia	51.2	48.1	44.9

Questions
   a) Calculate the percentage change in forest cover for Liberia.
   b) Draw a multiple line graph to represent the information in the table.

BAR GRAPHS

This type of graph is composed of bars representing individual amounts and there relative variations.

The length/height of the bars matches with the totals they represent.

Points to note when constructing Bar Graph

- The horizontal axis represents independent variables e.g. month, years, countries, crops etc.
- The vertical axis represents dependent variables such as rainfall, percentages and quantities of production.
- All bars must start from zero.
- The time sequence is from left to right on the horizontal axis.
- The width of the bars should be uniform. They shouldn't be too big or too small.
- The bars must be spaced; however the space left should be equal.

N.B: In cases where we have continuous variables such as rainfall, the bars may not be spaced.

Let us try out example 1 below:

Example 1

Study the table below showing Kenya's export crops (2003) in metric tonnes.

Table 11:

Export crop	Metric tonnes
Coffee	63,000
Oil palm	33,000
Tea	294,000
Sisal	24,000
Sugar cane	39,000
Tobacco	50,000

(a) Draw a Bar Graph to show the contributions of each export crop.

To draw the Bar Graph we must find suitable vertical and horizontal scales. We should use the procedure below to find the vertical scale.

- Identify the highest value in the table. In this case this value is 294,000.
- Choose the vertical height you wish, the vertical axis should have. Let's take 15cm.
- We continue and state that;

15cm rep 294(000) metric tonnes

lcm rep x

You cross multiply.

$$= \frac{15X}{15} = \frac{294(000)}{15}$$

x = 19.6 we round off this figure,

x = 20

Hence 1 cm will represent 20 (000) metric tones

Vertical scale: 1cm rep 20 (000) metric tones Horizontal scale: 1cm rep 1 crop.

To ensure accuracy of each bar we divide 20 (000) with each crop value and the units we get we simply use acentimeter ruler to plot them.

This is illustrated below.

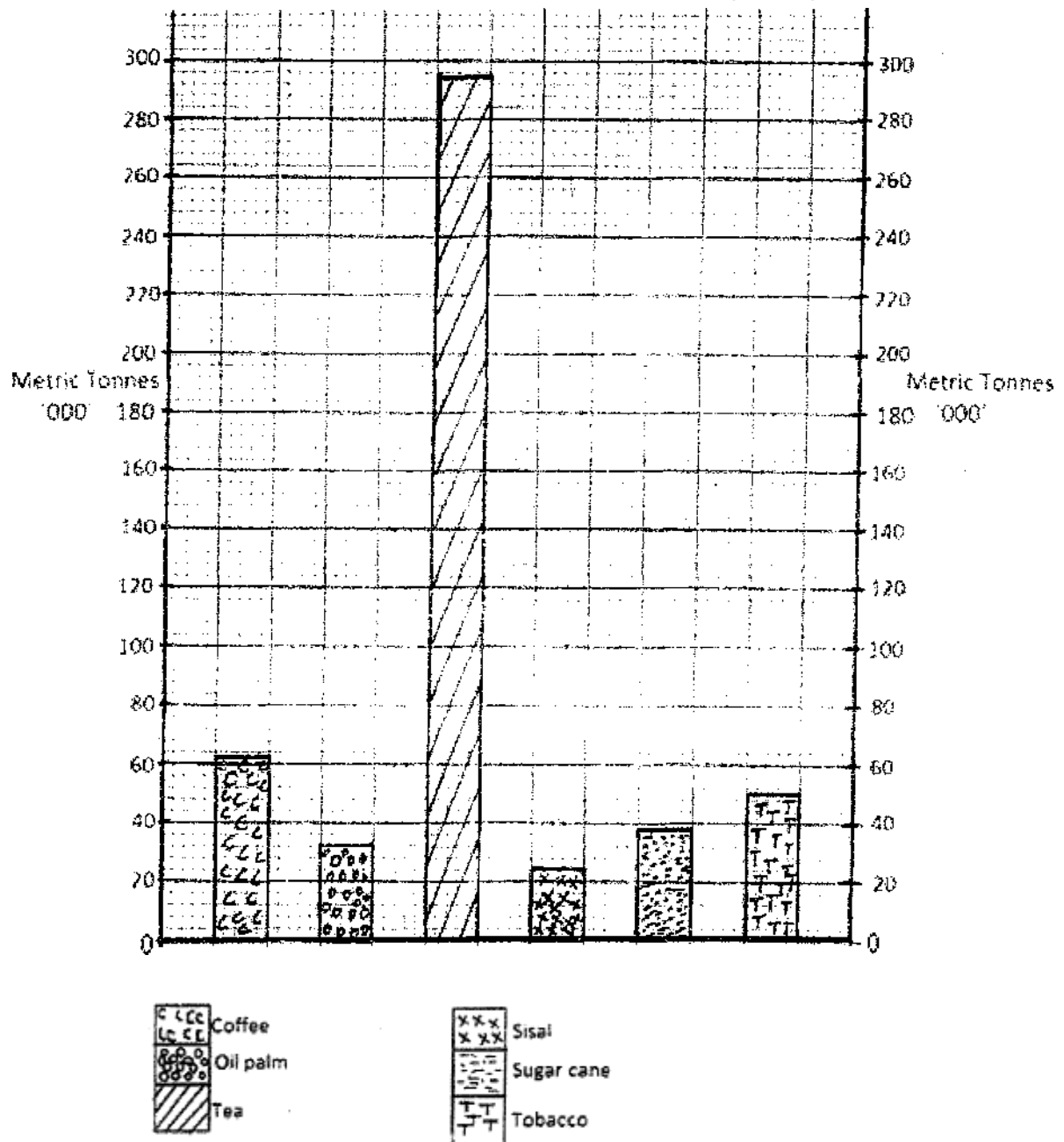| Export crop	Metric tones	Measurements to plot in cm
Coffee	63,000/=	3.15
Oil palm	33,000/=	1.65

Tea	294,000/=	14.7
Sisal	24,000/=	1.2
Sugar cane	39,000/=	1.95
Tobacco	50,000/=	2.5

A BAR GRAPH SHOWING KENYA'S EXPORT CROPS IN 2003 IN METRIC TONNES

SCALE;

V.S:　1cm rep 20(000)metric tonnes

H.S:　1cm rep 1 crop

b (i) State the largest export crop.

The largest export crop is Tea contributing 294000 metric tonnes

(ii) Explain the reasons why the crop identified above is the largest export crop.

- Tea has got a larger ready market abroad.

- Tea is less affected by pest and diseases hence the high production levels for export.
- There has been more investment of capital in tea growing activities leading to high production for export
- Improvement in the quality of tea which has led to increased demand abroad.
- Tea in Kenya occupies a bigger land area than the other crops leading to high production for export.
- Tea can easily be transported in large quantities at cheaper-costs hence the large tea exports.
- Tea yields higher profits compared to other crops due to its high prices on the international market.

Example 2

Study the table below showing Uganda's area under livestock production for selected countries and answer the questions that follow,

Table 12:

District	Land area cm^2	Growing area cm^2	Percentage growing area area
Mbarara	9,906	9,064	91.5
Masindi	8,406	7,734	
Luwero	8,539	7,728	90.5
Kotido	13,208	12,349	93.3
Moroto	14,113	13,196	

Adopted from: Economics of crop and livestock production (1993/1994): Agricultural policy committee. Agricultural secretarial P. J22.

(a)   Calculate the percentage grazing area for;

    i)   Masindi district

    $\dfrac{\text{Grazing area}}{\text{Land area}} \times 100$ = $\dfrac{7{,}734}{8{,}406} \times 100$ =   <u>92%</u>

    ii)   Moroto district

    $\dfrac{13{,}196}{14{,}113} \times 100$ =   <u>93.5%</u>

(b)   Draw a bar-graph showing the percentage growing area for the selected districts.

How to get the scale

- Identify the highest value in the table. Here it is 13196.
- Choose the vertical height you wish the vertical axis should have. Let's have 13cm. 13 cm rep 13196km^2
  Icm rep xkm^2
  Cross multiply

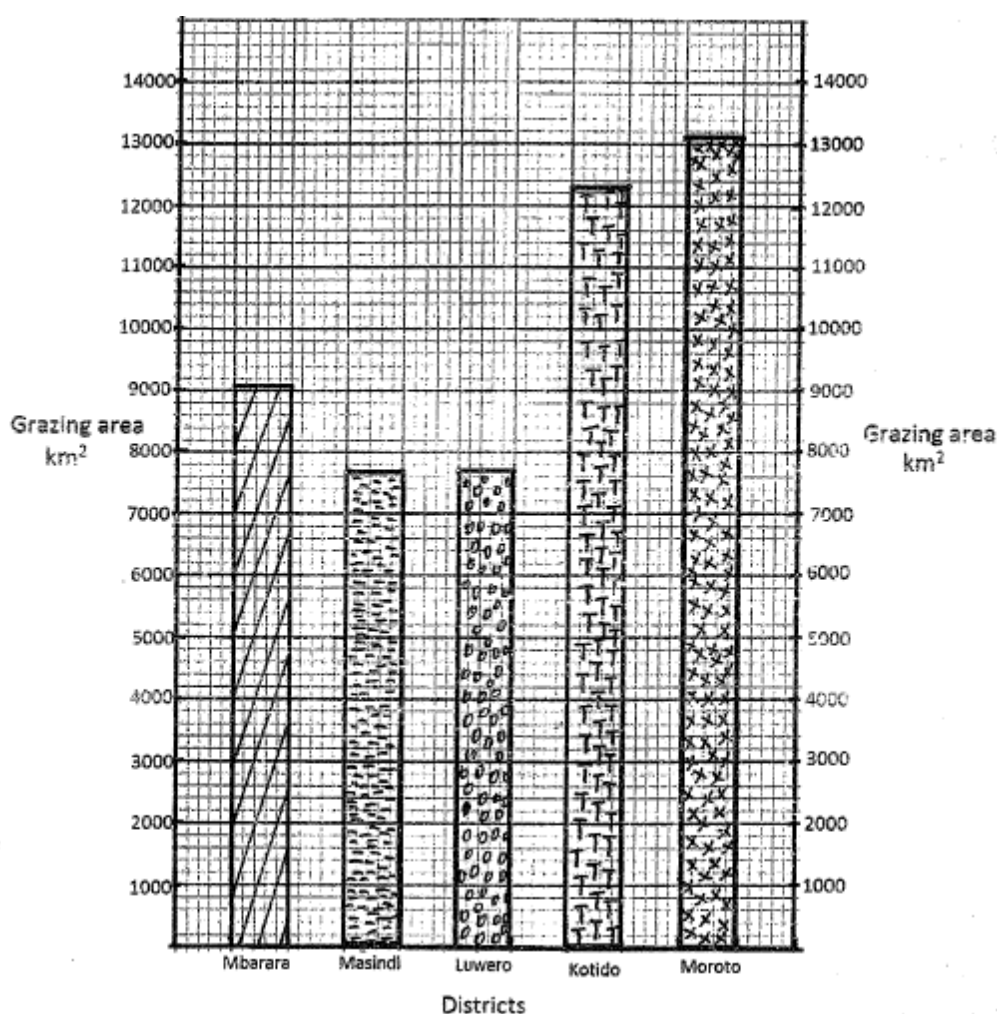$$\frac{13x}{13} = \frac{13196}{13}$$

X = 1015.07

We round this off to 1000So Icm rep 1000km^2

A BAR GRAPH SHOWING AREA FOR SELECTED DISTRICTS IN UGANDA

SCALE:
Y.S: lcm rep 1000km^2
H.S: lcm rep a District

Example 3

Study the table below showing the volume of palm oil output in Nigeria (1997 - 2002) and answer the questions that follow.

Table13:Nigeria volume of palm oil output (1997 - 2002)

Year	Output (metric tons)
1997	810,000
1998	845,000
1999	896,000
2000	899,000
2001	903,000
2002	950,000

(a) Draw a bar graph to represent the information given in the table Z

How to find the scale

-      Identify the highest value in the table

-        Choose suitable vertical height you wish the vertical axis should have, say 16cm

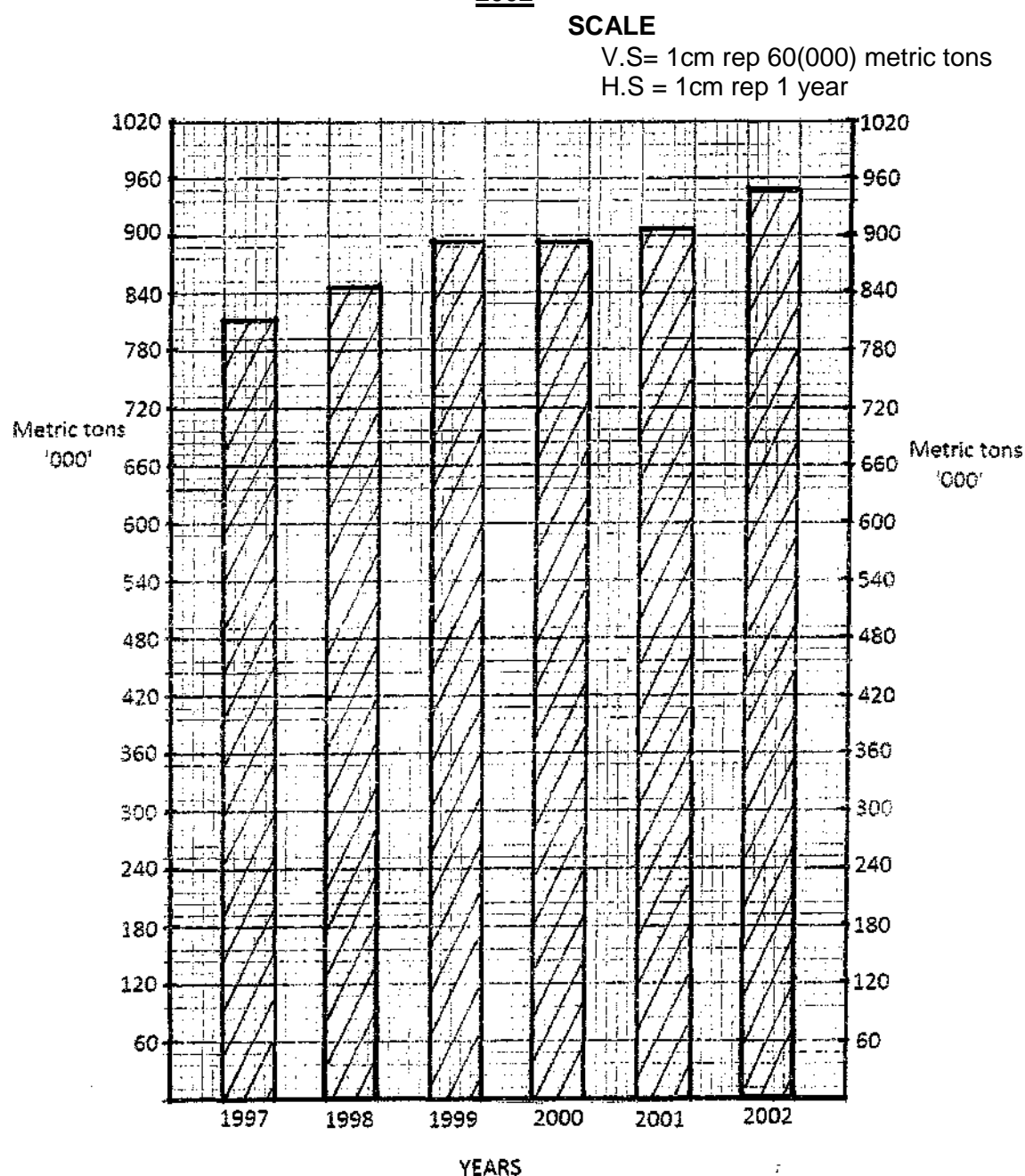16cm rep   950 (000) metric tonnes

1cm rep   x tones

We then cross multiply

$$\frac{16x}{16} = \frac{950(000)}{16}$$

X =   59.4 which we can round off to 60 So 1 cm rep 60 (000) metric tonnes

A BAR GRAPH SHOWING THE VOLUME OF PALM OIL OUTPUT IN NIGERIA (1997 – 2002

SCALE

V.S= 1cm rep 60(000) metric tons

H.S = 1cm rep 1 year

Exercises

1. Study the table below showing changes in forest cover for selected countries in Africa (1990 -2010) and answer the questions that follow:

Table 14: Changes in forest cover of selected countries in Africa (1990 - 2010)

Country	Forested Area as a percentage of total land area:		
	1990	2000	2010
Gabon	85.4	85.4	88.4
Democratic Republic of Congo	70.7	69.4	68.0
Republic of South Africa	6.8	5.7	4.7
Liberia	51.2	48.1	44.9
Senegal	48.6	46.2	44.0
Ghana	32.7	26.8	21.7

(a) Calculate the percentage change in forest cover for each country between 1990 and 2010.

(b) Draw a bar graph to represent the percentage area under forest cover for the selected countries in 2010.

2. Study the table below showing Switzerland's overnight tourist stays in selected communes in 2009 and answer the questions that follow.

Region	Commons	Overnight stays (000)
Plateau	Geneva	1891
	Bern	682
	Zurich	2469
Jura	Basel	1,016
Alps	Lugamo	565
	St Moritz	791

Adopted: The Swiss Tourism statistics, F50 (2010) P21.

(a) Draw a bar graph to represent tourist stays in Switzerland by communes in 2009.

(b) Calculate the total number of overnight stays in the Swiss;

i.   Alps

ii.   Plateau

3. Study the table below and answer the questions that follow:

Table 16:Land use in the Netherlands

Land use type	Total land area (Hectares)
Arabic fanning	770,000
Horticulture	140,000
Pasture	1505,000
Wood and wasteland	525,000
Others	560.000

(a) Draw a bar graph to represent the information given in the table above.

(b) Calculate the percentage area used for crop cultivation in Netherlands

4. Study the table below showing Uganda's export crops (2002 - 2003) in Metric tonnes and answer the questions that follow:

Table 17:

Export crop	Metric Tons (2002)	Metric tons (2003)
Coffee	201,000	40,000
Cotton	5,000	2,000
Tea	30,000	8,000
Sugar	1,000	
Tobacco	229,000	77,000
Cocoa	2,000	1,000

Adopted: 2005 African development indicators: The world Bam P92 - 100

   a) Identify the;
       i.   Leading
       ii. Lowest
      Export crop from Uganda in 2002
   b) Calculate the percentage change of each export crop between 2002 and 2003
   c) Draw a bar graph to show Uganda's export crops for 2002

5. Study the table below showing Sudan's agricultural export (2000) and answer the questions that follow:

Table 18: Sudan: Agricultural exports (2000)

Agricultural exports	Metric tons
Sugar	60,000
Meat	109,000
Cotton	232,000
Ground nuts	56,000

Adopted: 2003 African development indicators, the world Barm; PP96- 103

(a) Draw a bar graph to show Sudan's agricultural exports.

(b) State the;

i. Highest

ii. Lowest agricultural export from Sudan

6. Study the table below showing Tea production in Uganda from 1986 to 1991 and answer the questions that follow:

Table 19 Tea production in Uganda from 1986 to 1991

Year	Production in tons
1986	3,300
1987	3,500
1988	3,500
1989	4,200
1990	6,600
1991	8,300

Source: - Uganda Tea Authority Journal 2003

(a) (i) Draw a bar graph showing information in the table above.

ii) Calculate the percentage change in tea production shown in the table between 1986 and 1991.

(b) (i) Describe the trend of tea production from 1986 to 1991

(ii) Explain the factors for the trend described above.

COMPARATIVE BAR GRAPHS

This is also known as a group bar graph. It consists of bars drawn side by side to represent values such as total production of minerals, crops and industrial production.

In this method the bars are grouped together for purpose of comparison. These groups of bars stand side by side and each bar represents one item.

Points to note when constructing a comparative bar graph

- The horizontal axis represents independent variables e.g. months, years, crops, countries, etc.
- The vertical axis represents dependent variables such as rainfall, percentages and quantities of production.
- All bars must start from zero.
- The bars of each group are drawn touching each other as a cluster for comparison purposes.
- Equal space should be left after each group of bars.
- All bars must be of the same width.
- The bars in a group are usually drawn in a descending order from left to right beginning with a bar that represents the largest value except for a bar representing others which should be plotted last regardless of whether it is larger than any other values to be plotted or not.
- Different pencil shades or colours should be used on each variable to show the different variables.

NB

- There must be a key to help interpret what each bar shade or colour represents,
- No writing should appear- on the bars.

Example. 1

The table shows annual oil production for Libya and Nigeria between 1990 and 2005 in '000' litres

Country	f 1990	1995	2000	2005
Libya	163	1360	1628	2488
Nigeria	111	185	375	320

Using the table above, draw a comparative bar graph to show annual oil production for Libya and Nigeria between 1990 and 2005
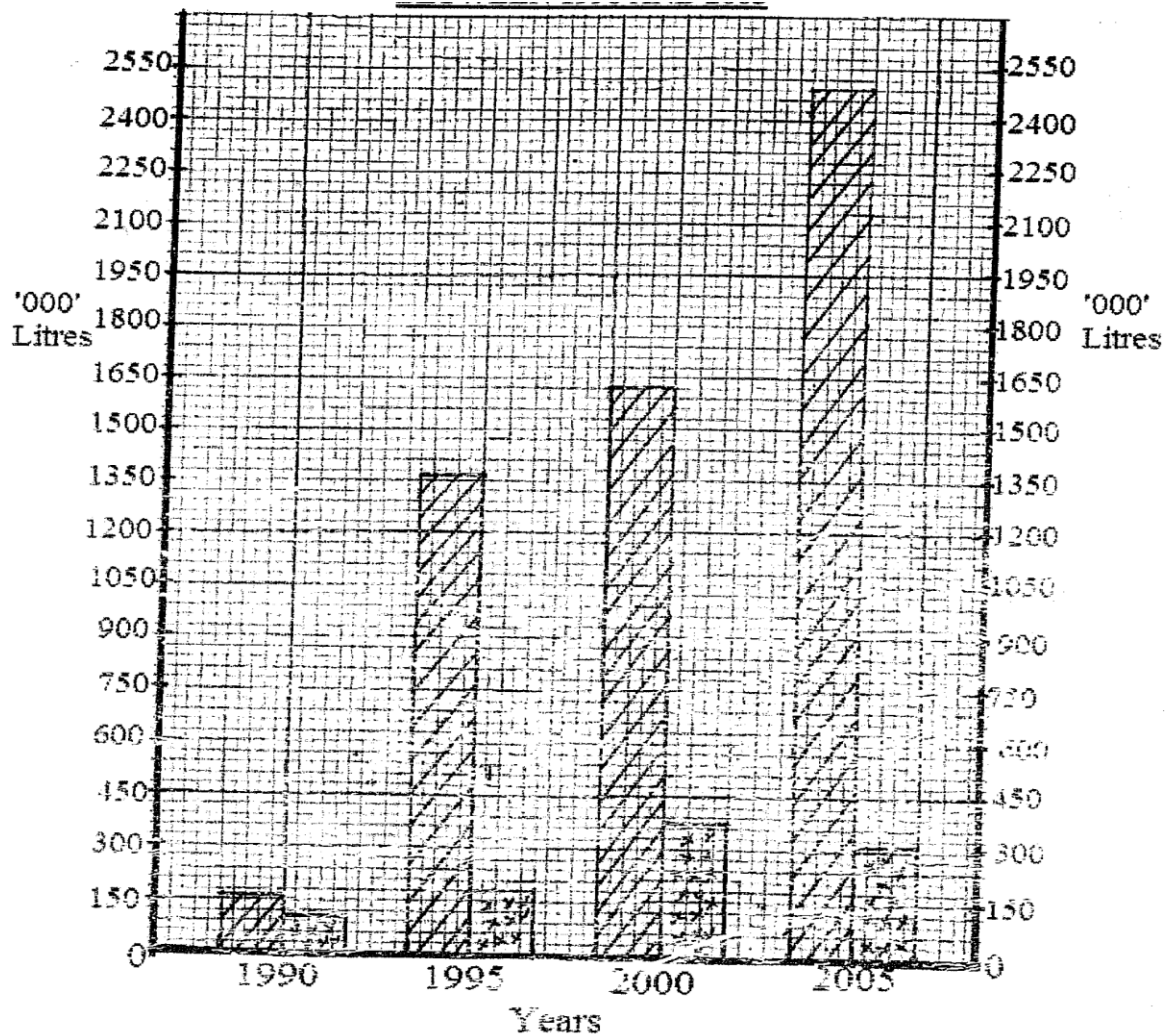
To draw a comparative bar graph, we must suitable vertical and horizontal scales. You can follow the procedures used to get the scale in other graphs.

For the graph below our scales are;

Vertical scale: 1cm   rep   150 (000) litres

Horizontal scale: 2cm   rep   1 year

A COMPARATIVE BAR GRAPH SHOWING OIL PRODUCTION IN LIBYA AND NIGERIABETWEEN 1990 AND 2005

Key

Libya

Nigeria

Exercises

1. Study the table showing the proportion of people employed in primary, secondary and tertiary industries in selected African countries in 2000 and answer the questions that follow.

Table 21:

Country	Primary industries	Secondary	Tertiary industries
Tanzania	83,000	60,000	11,000
Nigeria	540,000	19,000	27,000

a) Calculate the percentage of people employed in secondary industries of Tanzania and Nigeria.

b) Draw a comparative bar graph to represent the proportion of people employed in the primary, secondary and tertiary industries of Tanzania and Nigeria.

2. Study the table below showing imports for selected COMESA countries in million US dollars between 2000 and 2002 and answer the questions that follow.

Table 22:

COMESA countries	2000	2001	2002
Kenya	3420	3960	3595
Uganda	1933	1826	2790
Ethiopia	1162	1410	1374

a) Draw a comparative bar graph showing imports of selected COMESA countries between 2001 and 2002.

b) Describe the factors favouring international trade among tire COMESA countries.

BAR AND LINE GRAPHS

Bar graphs are often used in conjunction with line graphs. This type of graph has two graphs combined in one i.e. Bar and Line graph.

One graph is constructed to have Bars and a curved line. It is used to represent rainfall and temperature. It's therefore used to examine the relationship between rainfall and temperature in various climatic regions.

The line (curved) is at the top while the bars are at the bottom of the graph.

Two scales are used for each variable i.e. Temperature and Rainfall.

How to construct the Bar and Line graph

- The vertical axis should be labeled with the scales of the two variables i.e. rainfall and temperature.
- The bottom part of the vertical axis is labeled with a scale of rainfall in while the upper part is labeled with a scale of temperature in '°C
- Both scales must start at zero
- The horizontal axis is labeled with months of the year.
- When plotting the variable of rainfall, we use vertical bars with uniform width leaning against each other to show variations of rainfall amounts for each of the month.
- When plotting the variable of temperature, we use a curve line graph.Plot near points or small uniform crosses in the right and accurate locations depending on the scale being used.

NB: The points or crosses should be plotted in the middle of the bar.

- After plotting the points or crosses, they are joined together from the left to the right using free hands.

- Shade each independently to add a visual impression.

Other points to note

- Always use a sharp pencil 'when drawing such a graph.

- All writings must be horizontal on the graph paper.

- Finish your graph with a collect heading or title, for example;

A Bar and Line graph showing rainfall and temperature of Entebbe on Lake Victoria

Example I

Study the table below showing the climate of Libreville, Gabon and answer the questions which follow

Table23: Climate; Libreville Gabon

Month	J	F	M	A	M	J	J	A	S	0	N	D
Temp c	30	31	31	31	30	29	28	28	29	29	29	30
Rainfall(mm)	280	250	325	300	213	25	25	25	100	275	380	200

Source; Minns; W.J.A Geography of Africa, New Edition P37

a. Calculate the;

i. The mean annual temperature.

$$= \frac{30 + 31 + 31 + 31 + 30 + 29 + 28 + 28 + 29 + 29 + 29 + 30}{12} = \frac{3}{12} = 29.6^0 C$$

ii. The mean annual temperature range.

Highest - lowest

31-28 = 3°C

iii.   The mean annual rainfall

$$= \frac{280 + 250 + 325 + 300 + 213 + 25 + 25 + 25 + 100 + 275 + 380 + 200 \, 2398}{1} = \frac{2398}{1} = 2398mm$$

N.B:

- *Working of the calculations must be shown.*
- *Answers must have units.*

b) Draw a combined bar and line graph to show the climatic conditions of Libreville, Gabon. As any other graph, drawing a combined bar and line graph requires good planning. The planning involves determining the appropriate vertical and horizontal scales.

How to find the scale
- Identify the highest value for rainfall and temperature in the table.
- Choose the suitable vertical height you wish the vertical axis for rainfall and temperature should have, say 12cm for rainfall and 6cm for temperature.

Rainfall scale
12cm rep 380mm
I cm rep x mm
We then cross multiply,
multiply.
$=\frac{12x}{12} = \frac{380\,mm}{12}$
X =   31.7
Which we can make 30mm for
convenience, So 1 cm rep 30mm of
rainfall. So our scales will be as follows.
Vertical scale: R/F 1cm rep 30mm
Temp lcm rep 5°C
Horizontal scale: lcm rep 1 month for both.

Temperature scale
6cm rep 31 °C
1cm rep X
We thencross
$=\frac{6x}{6} = \frac{31}{6}$
x = 5.2
Which we round off to 5 So lcm rep 5°C

A COMBINED BAR AND LINE GRAPH SHOWING CLIMATIC CONDITIONS OF LIBREVILLE GABON

Months
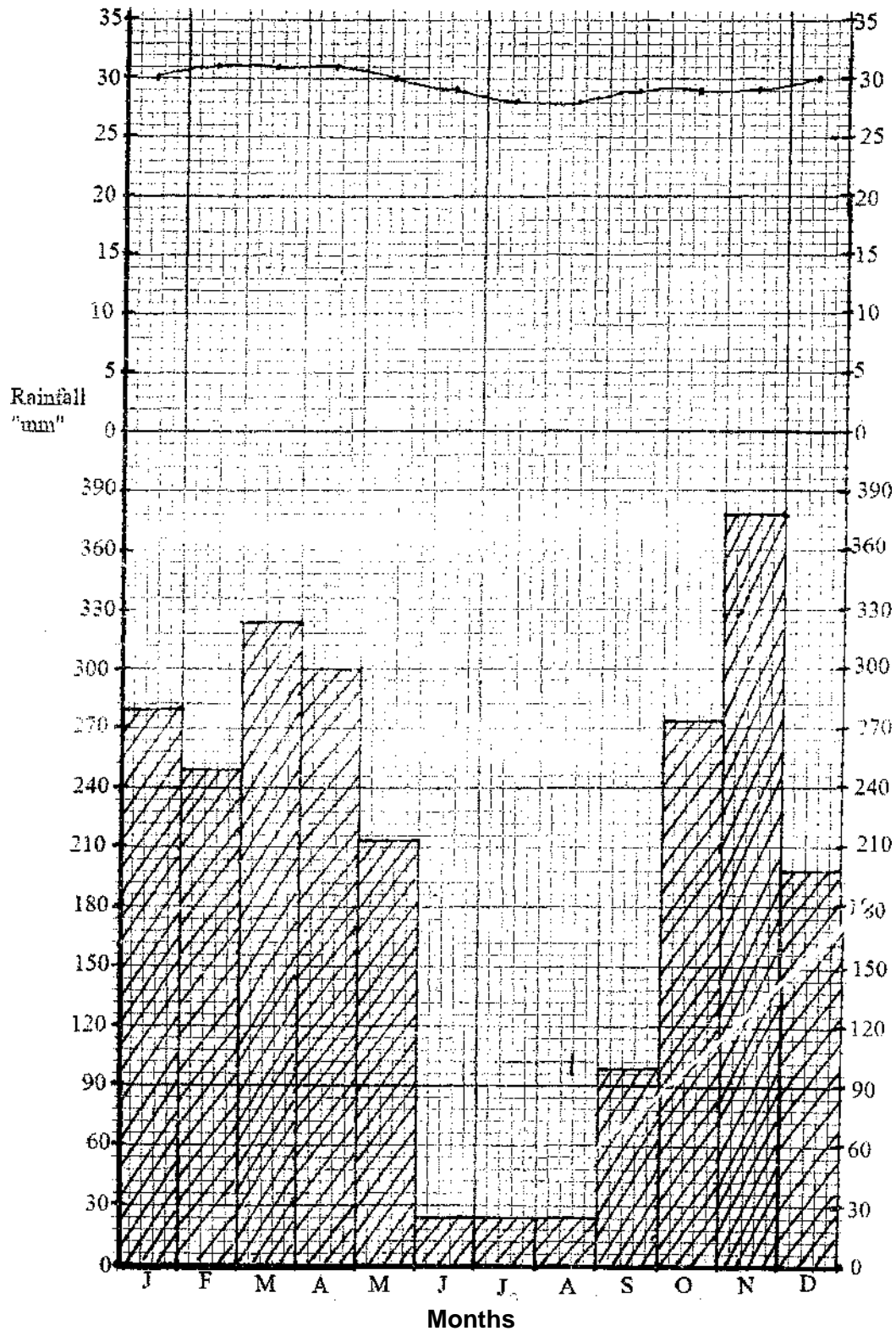
(a) Using the table and graph describe the climatic conditions of the station.

To describe the main characteristics of climate using the table and graph drawn we must always use the correct words or terms.

Below are some of the terms or words used when describing particular elements of climate

TEMPERATURE	Annual Range of Temperature °C	HUMIDITY

- Above 30°c very hot - Between 20°c - 29°c Hot - Between *10° c* - 19°c warm - Between 0°c -10°c cool/rnild - Between -9°c - 0°c cold -Below -10°c very cold	- Less than 5°c - small - Between 5°c-20°c-moderate - Greater than 20°c- Large	Above 50% - high humidity Below 50% -low humidity
RAINFALL		
- Above 1500mm-very heavy - Between 1000mm-1500mm- heavy - Between 500mm-1000mm- moderate - Between 250mm-500mm-dry - Less than 250m-very dry	- Above 125mm-very wet - 50mm - 125mm –wet - Less than 50mm - dry	

Other words which can be used to describe rainfall totals include;-

- Wet
- Moderate
- Reliable
- Well distributed/ poorly distributed
- Reliable/unreliable

Answers to question 'c' above describing the climatic conditions of Libreville, Gabon

- The station receives very heavy rainfall of 2398mmm
- It experiences two rainfall peaks/double maxima in March and November.
- November is the wettest month with 380mm
- The station experiences three dry months from July to August.
- The station experiences hot temperatures throughout the year
- The station experiences a small annual temperature range of 3°c.
- Relative humidity is high throughout the year at the station.
- There is dense/thick cloud cover much of the year.
- The atmospheric pressure is low due to the tot temperatures.
- Temperatures increase with increase in rainfall and they decrease with decrease in rainfall.

Example 2

Study the table below and answer the questions that follow

Table24:Station A

Month	J	F	M	A	M	J	J	A	S	0	N	D
Temp °C	-15	-11	-5	5	11	14	16	15	10	5	-4	-10
R/F (mm)	23	15	20	23	48	59	84	58	33	18	18	20

Source: physical Geography in diagrams by R.B.BUNETT*pg 163*

(a)   Calculate the;

i)   Mean annual Rainfall

23+15+20+23+48+59+84+58+33+18+18+20 $=\frac{419}{1}$ = 419mm

1

ii) Mean annual temperature

-15+-11+-5+5+11+14+16+15+10+5+-4+-10 $=\frac{31}{12}$ = 2.58^{o}C

12

iii) Mean annual temperature range

16 - -4 = 20^{0}C

b) Draw a Bar and Line graph to show the climatic conditions of station A

N.B:

In cases where there are negatives it's suitable to use a vertical scale on Temperature of lcm: rep 10°c in order in create space for the positive and negative temperatures is the verticalscale.
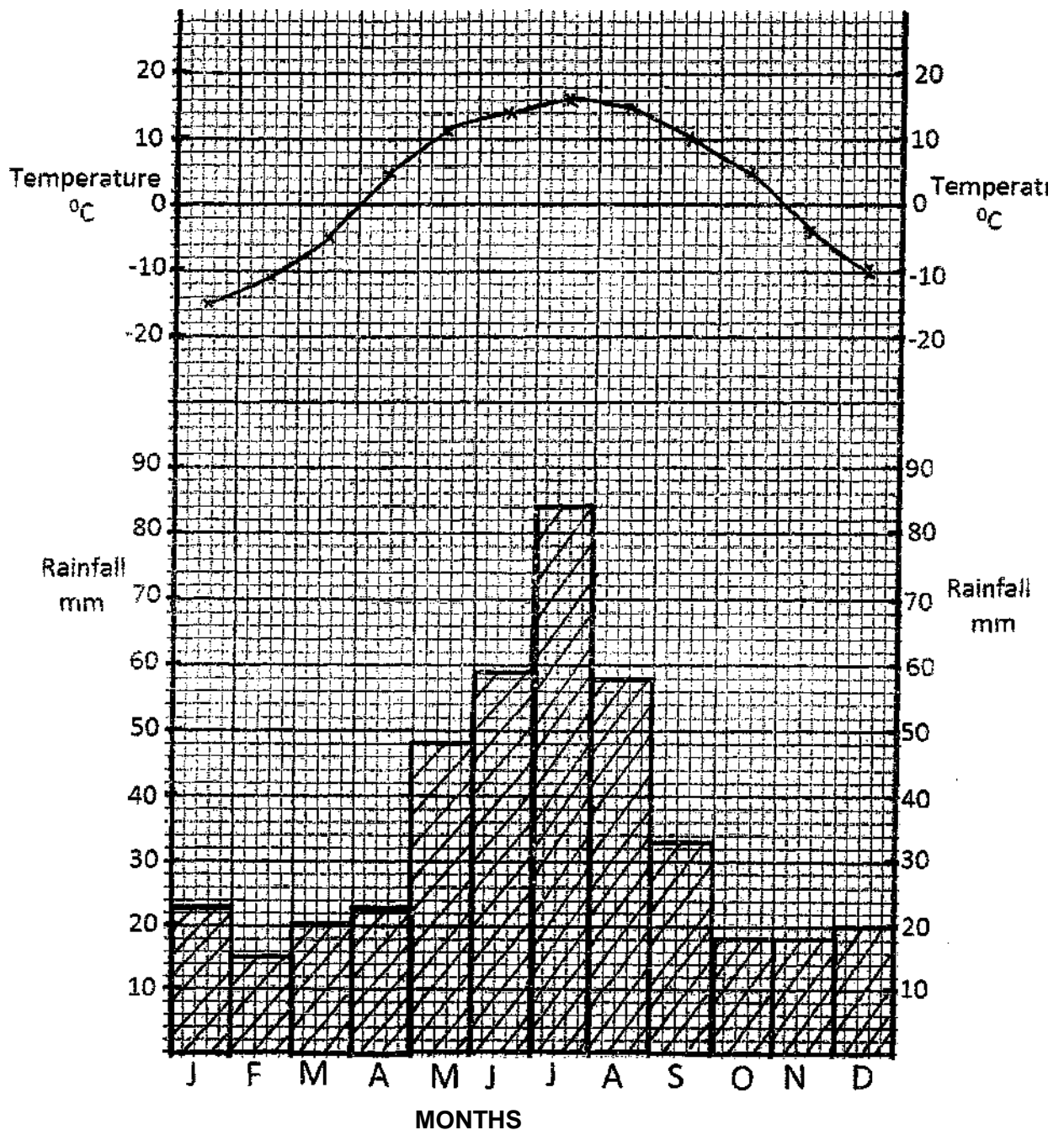
A BAR AND LINE GRAPH SHOWING THE CLIMATIC CONDITIONS OF STATION A

SCALE
V.S: = lcm rep 10mm (Rainfall)
lcm rep 10°C (Temperature)
H.S: = lcm rep 1 month

MONTHS

28

(c) Describe the characteristics of the climate experienced at the station
- It experiences wet summers while the winters are dry.
- Temperatures are warm in summer while the winters are very cold.
- It experiences one rainfall maximum in July.
- The annual temperature range is 20°c which is large.
- November is the coldest month with -4°c while June is the warmest months with 16°c

Example 3
Study the table below showing the climatic of station A and answer the questions that follow
Table 25: Station A

Month	J	F	M	A	M	J	J	A	S	O	N	D
Temp(c)	22	24	27	32	31	27	26	25	26	26	25	23
R/F(mm)	-	-	-	25	75	125	200	325	150	25	-	-

(a) Calculate the;

i. Mean annual temperature

$$= \frac{22+24+27+32+31+27+26+25+26+25+23}{12} = \frac{314}{12} = 26.2 °C$$

ii. Mean annual rainfall

$$= \frac{25+75+125+200+325+150+25}{1} = \frac{925}{1} = 925mm$$

iii. .Annual temperature range

Highest - lowest

32 -22 = 10^0C

b) Giving a reason for your answer, state tire hemisphere in which station is located.

How to determine the hemisphere where a given climatic station is located

In order to do this, it is important to know how the sun moves in relation to the Equator, tropical of Cancer and tropical of Capricorn. This movement is illustrated below
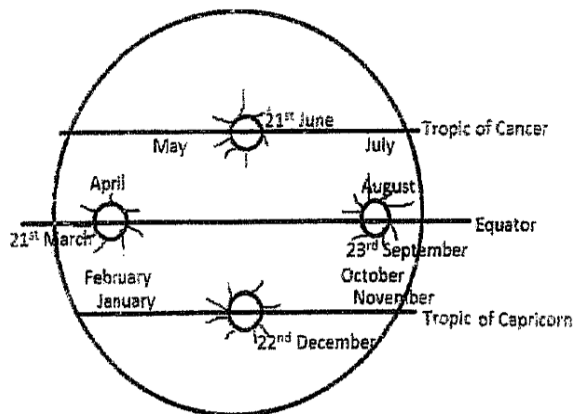
- As you notice from above, from April, May, June, July, August till late September, the sun is in the Northern hemisphere. And from late September to October, November, December, January, February till late March, the sun is in the Southern hemisphere.
- So in order to determine the hemisphere, where a given climate station is located, we put our focus on temperature and rainfall variations in relation to the sun's movements within the tropics.

Approach to question (b) above

When you observe in the climate table25 above, the hottest temperatures are experienced around April, May and June, a period when the sun is in the Northern hemisphere. And the temperatures are lowest around December and January when the sun is in the Southern hemisphere.

So the station A is located in the Northern hemisphere because it experiences the hottest temperatures around the month of April and May when the overhead sun is around the tropical of Cancer in the Northern hemisphere.

c. Explain the influence of the climate at station A on human activities Approach

When answering such a question, it is very important to attach each economic activity to the climatic conditions of the station as shown below in the following answers

- The moderate rainfall received supports the growing of annual/ seasonal crops encouraging crop cultivation.
- The moderate rainfall and hot temperature support the growth of forests which encourages lumbering activities,
- The seasonal and moderate rainfall supports the growth of grass vegetation which encourages the activity of animal rearing.
- The hot temperatures and moderate rainfall support activities such as agriculture, lumbering which provides commodities encouraging trade and commerce.
- The moderate rainfall has also supported growth of abundant grass on which wild animals graze encouraging tourism activities.

Example 4

Study the table below showing climate statistics of Entebbe Uganda on Lake Victoria

Table26:

Months	J	F	M	A	M	J	J	A	S	0	N	D
Temp "C	27	27	27	26	25	25	25	26	27	27	26	26
Rainfall (mm)	65	85	150	250	225	125	75	75	75	112	125	125

a. Calculate:

i) Mean annual temperature

$= \frac{27+27+27+26+25+25+25+26+27+27+26+26}{12} = \frac{314}{12} = 26.17^0C$

ii) Mean annual temperature range

Highest - Lowest = 27-25 = 2°C

ii. Mean annual rainfall of the station

$= \frac{65+85+150+250+225+125+75+75+75+112+125+125}{1} = \frac{1487}{1} = 1487mm$

b. Describe the climatic conditions of Entebbe Uganda

- It receives heavy rainfall of 1487mm
- It experiences a two rainfall peaks (double maxima) in March to May and October to December.
- The station receives rainfall throughout the year.
- March to May wet season is longer and heavier compared to the October to December wet season.
- Convectional rainfall is received occurring in the afternoons and evenings. Temperatures are hot throughout the year.

- It experiences a small annual temperature range of 2°C.
- Humidity is high throughout the year.

C. Describe the factors responsible for the climatic conditions of Entebbe described above.
Approach:

This question requires one to describe factors which are responsible for the variations of climates of different places. However they must be related to the climatic station of Entebbe. Such as these below;

- Location of Entebbe near Lake Victoria which is a source of water vapour hence the heavy rainfall received,
- The low altitude of Entebbe which is responsible for the hot temperature throughout the year.
- Location along the equator hence the hot temperature and heavy rainfall received.
- Presence of dense vegetation cover of forests which is responsible for the formation the heavy'- convection rainfall received at the station.
- The human activities such as afforestation and reforastations hence the heavy rainfall received.

Exercises

Study the table below' showing mean monthly temperature (in°C) for two stations in. EastAfrica and answer the questions that follow.

Table 27:

Station	Altitude	J	F	M	A	M	J	J	A	S	0	N	D	Mean
Mombasa	17m	27	28	28	27	26	25	24	25	25	26	27	27	26
Nairobi	1820m	18	19	19	19	18	17	16	16	17	18	18	18	18

Source; Lands 8 people E. Africa by Gladys Hickman

(a) (i) Explain how mean monthly temperature is obtained.

(ii) State the relationship between altitudes and mean annual temperature in the table

(b) Calculate the:

(i) Mean annual temperature of Mombasa and Nairobi

(ii) Annual temperature range of Mombasa and Nairobi

(c) Draw a suitable graph to represent mean monthly temperature of Mombasa station=

(d) Explain factors influencing temperature of any place in East Africa.

2. Study the table below showing the climate Of Harare .Zimbabwe and answer the questions that follow

The climate of Harare, Zimbabwe (Altitude 1500)

Table 28:

Month	J	F	M	A	M	J	J	A	S	0	N	D
Temp c	24	23	22	21	20	18	17	18	20	23	24	24
R/F (nun)	200	175	100	25	20	-			-	50	100	175

Sources; Minns W.J.A Geography of Africa New East Africa P.36

(a)   Draw a suitable graph to show the climate of Harare

(b)   Calculate the;

(i)   Mean annual rainfall

(ii)   Mean annual temperature

(iii)   Annual range of temperature for the station

(c)   (i)Describe the characteristics of the type of climate experienced at the station
(ii)Explain the factors influencing the climate of Harare

(d)   How has climate influenced agricultural activities in the region at the station?

3.   Study the table showing the climate of Winnipeg on the Canadian prairies and answer the questions that follow;

Table 29: Winnipeg: Canada- Altitude 232m

Month	T J	F	M	A	M	J	J	A	S	0	N	D
Temp(c)	-20	-17	-9	2	11	16	19	18	II		-6	-14
R/F (mm)	2 J		28	34	56	79	77	64	5		26	23

Adapted jratn young, E. IV and Lowry, J.H. (1984) A Course in World Geography - North America, Edward Arpad, and P.31

a.   Draw a suitable graph to show the climate of Winnipeg

b.   Identify the;

i.   Coolest

ii.   Wettest month of Winnipeg station c Calculate the;

i.   Mean annual rainfall

ii.   Annual range of temperature for Winnipeg station.

d. Explain the climate related problems faced by farmers living on the Canadian prairies.
4. Study the table below showing the climate of free town on Sierra Leone coast and answer the questions that follow:

***Table30:*Free town:-Sieira Leone coast**

Month	J	F	M	A	M	J	J	A	S	O	N	D
Temp(c)	30	31	31	30	29	28	27	27	28	29	30	30
R/F(mm)	25	25	50	100	275	500	900	925	700	300	125	25

(a)   Draw a suitable graph to show the climate of free town

(b)   Calculate the (i) Mean annual temperature

(ii)   -Mean annual temperatun range

(iii)   Mean annual rainfall

(b)   Describe the characteristics of the climate ofthe station

(c)   Explain the factors responsible for such clinatic reasons.

6. Study the table below showing the climate of Cape Juby - Moroccan coast and answer the questions thatfollow

Table 32: Durban, Natal province, Republic of South Africa

Month	J	F	M	A	M	1	J	A	S	O	N	D
Temp(^{O}c)	25	26	24	22	20	n	17	18	19	21	23	24
R/F(MM)	112	125	135	85	50	20	25	37	75	125	125	125

Source; Minns, W.J A Geography of Africa New Edition p.3l

   (a) Draw a suitable diagram to represent the information in the table.

   (b) Calculate the;-

   i. Annual temperature range.

   ii. Total annual rainfall.

   (c) (i) Describe the relationship between temperature and rainfall at the station,

      (ii) Identify the factors responsible for the relationship described in (c) (i) above.

d) Explain the effect of climate on agricultural activities in the Natal province.

STATISTICAL CHARTS

Statistical charts and diagrams are usually used to show how a given total is made up of individual items. They can be used to show information related to trade like exports and imports of particular countries, population totals and composition etc.

Under this category we shall focus on pie-charts which are also known as *Divided* circles.

PIE CHARTS/DIVIDED CIRCLES

A pie chart is also called a divided circle or divided percentage circle. This is a statistical diagram used to show how a given total is made up of individual items. These are circles divided into segments that represent value for different components. They are used to represent a wide variety of information.

A pie - chart is constructed on the principal that 360° is equivalent to 100%. Therefore this is equivalent to:

360 - 100 = 3.6°

The principle 1% is equal to 3.6 degrees is therefore used during the construction of segments on the circle.

Procedures during construction of a pie- chart

Study the data given and if their totals are not given, add up and get overall sum. Calculate the degrees for each item by using the formula below

Component item x 360°

Sum total

if items are given in percentage, to convert into degrees we use the formula below

Component item x 360°

Sum total

- The figures got will determine the size of the segment of that component
- Draw a circle of a convenient size of the least not less than 4cm of radius
- When marking the segments start at 12 o'clock position by drawing a vertical radius.
- Geographically when drawing a pie chart the biggest segment should be drawn first and end with the smallest segment.
- However the order of the variables in the table can also be followed when constructing segments.
- Regardless of the size or value the segment for 'others' is placed last to the immediate left of the 12 o'clock position.
- Different colours or shade are used in the segments and a key is constructed.
- In a pie chart representing relatively importance the values or percentage originally given in the table should be marked in each segment.

N.B

All lines separating segments must pass through the **center and must not** go through the circle

Example 1. Study the table below showing the population of East Africa in 2009 and answer the questions that follow:

Table33:

Country	2009 Population '000'
Kenya	39,800
Uganda	32,700
Tanzania	43,700
Total	

(a) Draw a pie chart to show the population of East Africa in 2009,

Procedures to follow:-

Calculate the total population of the three East African countries.

39800 + 32700 + 43700   =   116200(000) people

Converting into degrees
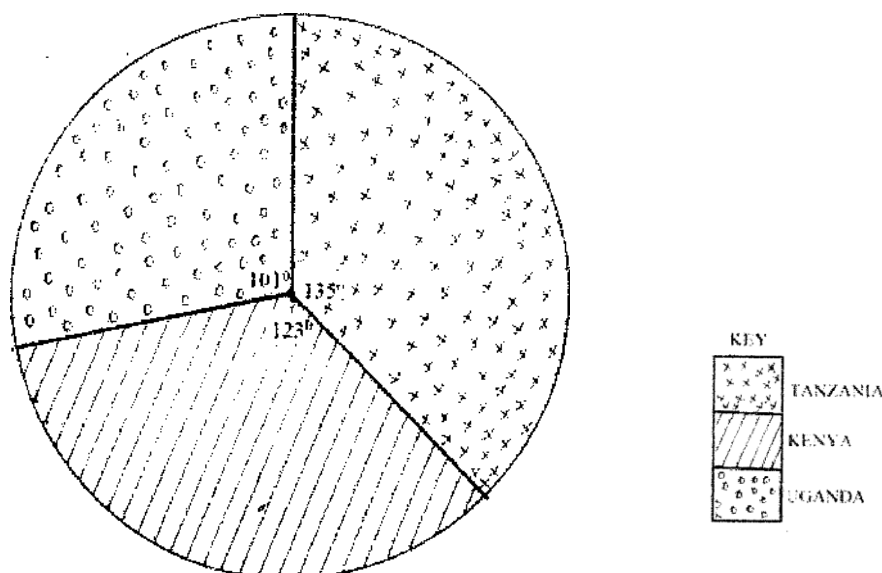
$$= \frac{Item}{Total} \; x \; 360^0$$

Kenya = $\frac{39,800}{116,200} \; x \; 360^0 = 123.3^0$

Uganda = $\frac{32700}{116,200} \; x \; 360^0 = 101.3^0$

Tanzania = $\frac{43700}{116,200} \; x \; 360^0 = 135.4^0$

A PIE CHART SHOWING POPULATION OF EAST AFRICA

Example 2

Study the table showing the volume of Canada's wood related industrial production in 1976 and answer the questions that follow.

Table 34:

Products	Volume in '000'tonnes
Pulp	6,768
Paper and paper board	11,341
News print	6,997
Total	

(a) **Calculate the total volume of the products in the table**

6768000 + 1134000 + 6997000   =   25106000tonnes

(b) **Draw a pie chart to represent the relative importance of each product shown in the table.**

Procedure; When we are drawing a pie chart showing relative importance using raw data, we fast of all convert the raw data in the table info percentages and then convert the percentages got into degrees io draw a pie chart.

This is illustrated below;

Converting the figures into percentages

Pulp   = $\frac{6768}{25106} \; X \; 100 = 27\%$

35

Paper and Paper Board $=\frac{11341}{25106} X 100 = 45\%$

News Print $=\frac{6997}{25106} X 100 = 28\%$

Using the percentages to calculate the degrees

Pulp $=\frac{27}{100} X 360 = 97.2^0$

Paper $=\frac{45}{100} X 360 = 162^0$

News print $=\frac{28}{100} X 360 = 100.8^0$

A PIE CHART SHOWING THE RELATIVE IMPORTANCE OF CANADA'S WOOD RELATED INDUSTRIAL PRODUCTS IN 1975
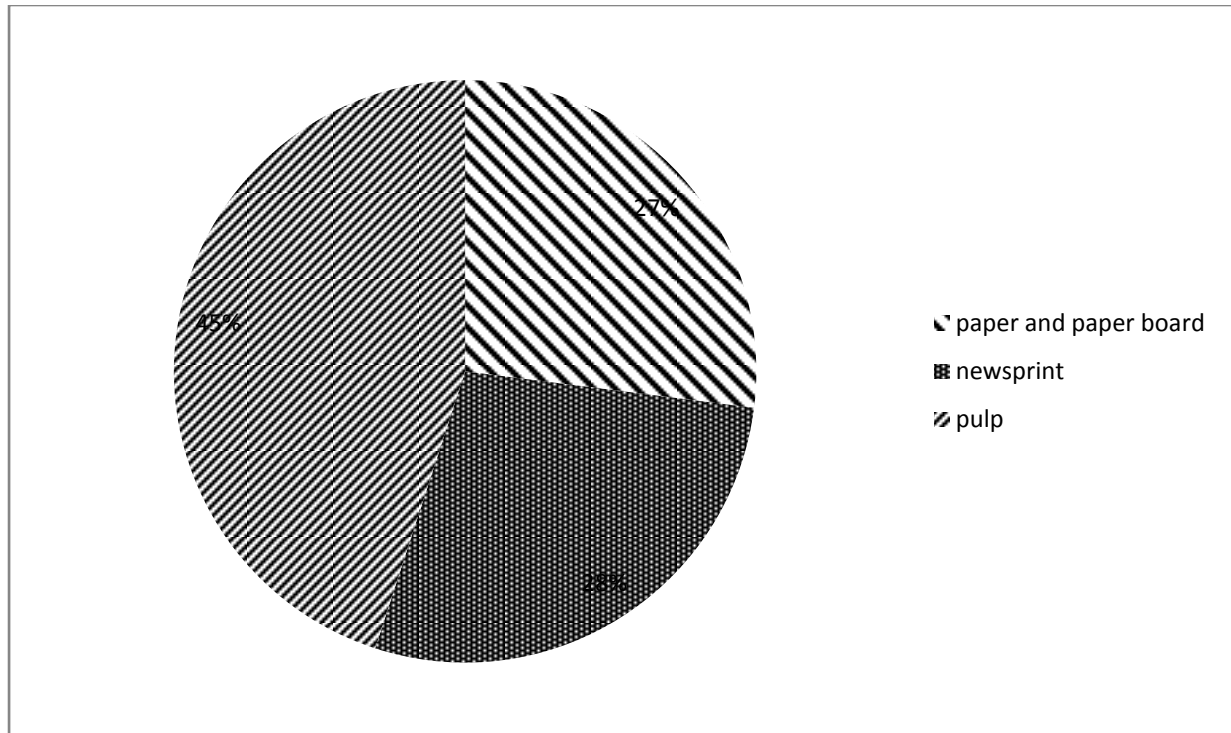
N.B:

However where the values in the table are given in percentage, directly convert them into degrees to draw a pie chart

(c) Explain the relative importance of news prim among Canada's wood related industrial products.

Procedure:

Relative importance;

This is calculated by dividing the individual amount over the total multiplied by 100%

$$=\frac{Individual\ \ amount}{total} X 100$$

$=\frac{6997}{2516} X 100 = 27.9\%$

Hence News print is the second with 27.9%

Exercises

1. Study the table below showing total fish production under the fishing ground in Canada

Table35:

Fishing ground	% of fish production
maritime	16.4
Great lakes	9.5
British Columbia	59.5
New found land	14.6

a) State two main facts about Canada's fishing ground production as revealed by table and pie chart.

b) Draw a pie chart to show Canada's fishing ground production.

1. Study the table below showing overnight stays by foreign tourists in the various forms of accommodation in Switzerland in 1973

Table36:

Form of accommodation	Foreign tourists in' 000'	%
Youth hostels	778	
Chalets	19750	
Camping and caravan sites	5500	
other	5600	
Total		100

(a) Calculate the:-

i) Total foreign tourists in '000' in Switzerland 1973

ii) Percentage of each form of accommodation

(b) Draw a pie-chart to show the form of accommodation used by foreign tourists in Switzerland in 1973

3. Study the table below showing the volume of cereal output in East Africa 1999 and answer the questions which follow.

Table37:

Cereal crop	Volume of output(metric tons)
maize	5,338,000
millet	832,000
rice .	676,000
wheat	135,000
sorghum	1,015,000
Total	**7996,000**

Adapted: Africa development indicators (2001): The world DC pp 2238225

(a) Draw a pie chart to show the relative importance of each cereal crop.

(b) Name the cereal crop which was produced in

i. Lowest

ii. Highest quantities in 1999.

4. Study the table below showing urban population for selected countries in Africa (2000) and answer the questions that follow:

Table38:   Urban population for selected African countries (2000)

Country	Urban population(000)
Egypt	31,000
Ethiopia	12,000
Nigeria	57,000
South Africa	23,000
Zimbabwe	4,000

Adopted from; World resources (1998/99); A hurdle to the Global Environment.
Environmental charge and human health, world resources institutep 275

(a) Draw a pie chart to show the proportion of the population living in urban areas.
(b) Name the country with the:
 (i) Highest
(ii) Lowest urban population.

5. Study the table below showing the percentage of the population employed in the various sectors in British Columbia and answer the questions that follow:

Table39:British Columbia:-percentage of population engaged in various sectors.

Type of sector	Percentage of population employment
fishing	04
agriculture	06
forestry	35
mining	n -
others	44
Total	100

Adopted from; Monk house, F J and Cain, H.R. North American: A certificate series:
Longman pg 42

i.   Draw a pie chart to show the relative importance of the different employment sectors.

ii.   Identify the relative importance of the mining sector in British Columbia.

6) Study the table below showing the relative quantity of forestry' products in Uganda for 2005 and answer the questions that follow;

Table 60

Forestry products	Million tonnes
Fire wood	23.8
Charcoal	6.1
Poles	08
Sawn timber	0.9
Total	31.6 million tonnes

(a)   Calculate the total percentage of wood fuel that was used in Uganda in 2005.
(b)   Draw a pie chart to show me relative importance of each forest products in 2005.

BASIC LANGUAGE FOR DESCRIBING GEOGRAPHICAL PHENOMENA

SOIL	RELIEF	VEGETATION
- Fertile/infertile - Deep/shallow - Well drained/ poorly drained - Acidic - Alluvial - Loess - Thin skeletal - Sandy, clay, clay - loam etc.	- Relatively flat, low lying area - Steep slope - Gently sloping - Valley	- Forested, dense/ thick forest - Scattered trees - Grasslands - Swampy vegetation
DRAINAGE	**LAND**	**WATER**
- Well drained areas - Poorly drained areas/ water logged/ impeded	- Large area/ expanse - Extensive area - Large tracts of land - Abundant land - Vast land	- Constant supply - Large amount - Plenty of fresh water - Reliable source
LABOUR	**MARKET**	**CAPITAL**
- Skilled labour - Semi skilledlabour - Unskilled labour - Large supply of - Cheap labour - Shortage of labour - Inadequate supply oflabour	- Large/small market - Ready market - Abundant market - Reliable/unreliable market - Wide/big market - High purchasing power of the people	- Adequate/Indequate capital - Large sums of capital - Reliable source of capital - Varied soirees of capital e.g. bank cans, government grants etc
RAW MATERIALS	**TRANSPORT**	**TECHNOLOGY**
- Skilled labour - Semi skilledlabour - Unskilled labour - Large supply of - Cheap labour - Shortage of labour - Inadequate supply of labour	- Reliable/unreliable - Efficient - Flexible - Cheap - Fast - Accessible	- Cheap/ labour intensive - Appropriate/inappropriate - User friendly - Advanced/ low levels - Capital intensive
GOVERNMENT POLICIES	**ENERGY/ POWER SOURCES**	**INFRASTURE**
- Supportive government policy - Positive government policy - Negative government policy	- Reliable - Efficient - Cheap - Wide variety - Large supply - Constant supply	- Adequate social infrastructure likehospitals, schools, water supply etc. - Adequate *economic* infrastructure like roads, power, railway, ports etc.
EMPLOYMENT	**INCOME**	
- Ready source/ opportunities - Assured/ reliable - Large source	- Adequate - Regular source - Reliable - Ready source	

CLIMATE OF EAST AFRICA

Climate is the average weather conditions for a place recorded for a long period of time usually 35yrs. In East Africa, there are four major types of climatic zones which are; Tropical/equatorial climate, Savannah climate, Desert/semi-arid climate and montane climate. Climate influences human activities e.g. agriculture, settlement, feeding, dressing and other physical aspects like vegetation.

Factors influencing the climate of East Africa

a)   **Altitude:** Climate changes with height above sea level. Areas near mountains receive heavy rainfall and low temperature especially on the windward side e.g. Mt. Kenya, Elgon, Kilimanjaro. Altitude also influences temperature differences e.g. areas on a higher altitude are cooler e.g. Nairobi, Kabale and Kampala while lowland areas receive high temperate e.g. Mombasa and Kasese.

b)   **Distance from the sea:** Areas close to water bodies receive heavy and reliable rainfall e.g. shores of Lake Victoria (Kisumu, Entebbe, Bukoba, Mwanza and Nyanza province). This is due to the abundant moisture released into the atmosphere through evaporation whereas areas which are far away from water bodies receive low and unreliable rainfall and hot temperature due to less moisture release e.g. Dodoma, Karamoja and Masailand.

c)   **Latitude:** Climate changes as one moves away from the equator, North or south. The equator influences the occurrence of the Inter-Tropical Convergence Zone (ITCZ). This is in relation to apparent movement of the overhead sun. Areas around the equator receive double maxima of rainfall and hot temperature between February and May and between September and November e.g. Entebbe, Kisumu while areas that are far away from the equator receive single maxima of rainfall e.g. Gulu and Dodoma.

d)   **Relief:** Highland areas act as barriers to prevailing winds. In such areas, there are differences between the conditions on the lee ward side and the wind ward side. The leeward side receives little or no rainfall because it's in the rain shadow e.g. Kasese and Arusha while areas on the wind ward side receive heavy rainfall and lower temperatures e.g. Mbale and Kigezi region.

e)   **Vegetation:** Areas with tropical rainforests receive heavy rainfall due to abundant moisture release through evapo-transpiration e.g. near Mabira forest in Mukono district while areas without vegetation cover receive hot temperatures and low rainfall e.g. Kondoa region (Miombo woodlands), Machakos, Turkana land and Karamoja.

f)   **Influence of man:** Due to man's activities such as bush burning, swamp reclamation and deforestation, this leads to disappearance of vegetation hence low rainfall and high temperature. Urbanisation through industrialisation and road construction has also led to global warming hence hot temperatures in cities e.g. Kampala and Dodoma. Activities such

as afforestation and re-afforestation have led to growth of vegetation hence leading to heavy rainfall.

g) **Influence of trade winds i.**e the North East trade winds a dry wind blowing over Karamoja areas and North Western Kenya have led to Hot and dry climatic conditions in the region, South East trade winds and Westerlies are moisture laden winds responsible for heavy rainfall around Lake Victoria and windward slopes on Mt. Rwenzori.

h) **Influence of local winds:** Trade winds have got an impact especially along the coastal areas and shoes of Lake Victoria. They lead to formation of land and sea breezes.

   (i) **Land breeze:** it takes place during the night. After sunset, both the land and the sea cool down but land cools down faster than water meaning that air over land becomes cooler than air over water. Moist air therefore flows from land to the sea or lake. Warm air over the sea is forced to rise up to the condensation level forming clouds and forming rain which falls especially during the morning hours.
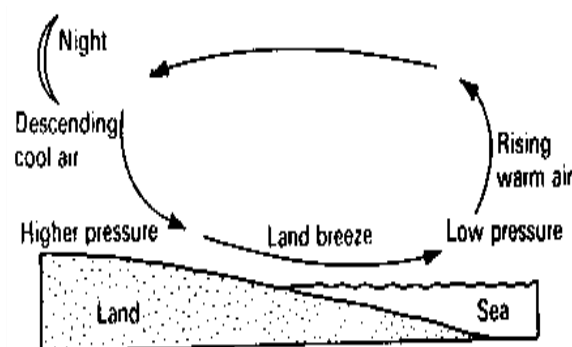
(ii) Sea breeze: it takes place during the day

When land heats up faster than the water, Air above land becomes warmer and it's forced to rise up forming a low pressure zone on land. Moist air from the sea begins to push its way beneath the warm air over the land. The warm air is pushed upwards to the condensation level where it forms clouds which fall back as rainfall especially during the afternoon hours.
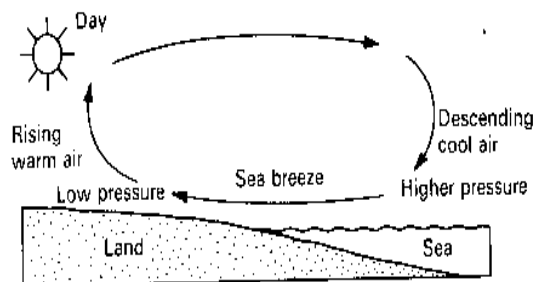

N.B: Temperature inversion: This is a situation where temperatures at high altitude are warmer than those in the valleys or it's a situation where temperatures increase with increase in altitude e.g. near Kenya highlands and Kigezi.

MAJOR CLIMATIC TYPES IN EAST AFRICA

The major climatic types in East Africa include

- Equatorial/tropical climate
- Savannah climate
- Desert and semi desert climate
- Montane climate

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A SKETCH MAP OF EAST AFRICA SHOWING CLIMATIC REGIONS.
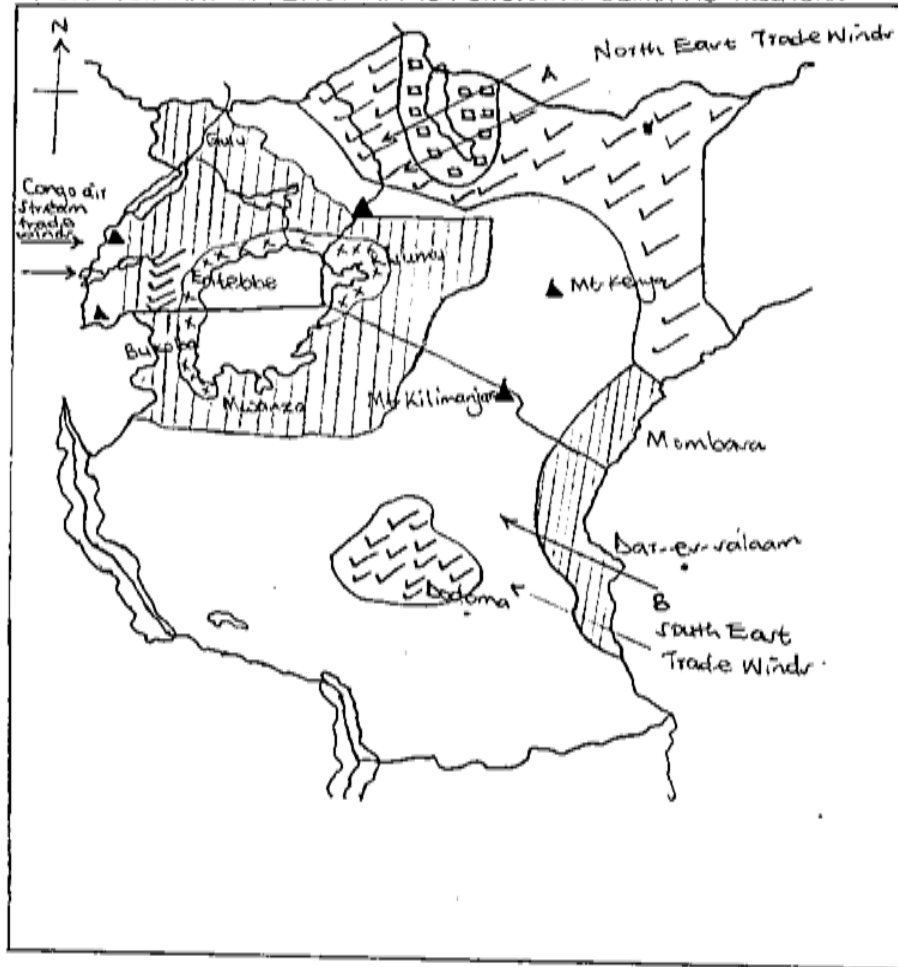
KEY

XXX	Equatorial
▢▫/▫▢	Desert
‖‖‖	Humid Tropical
⧄	Semi-desert
▲	Montane (modified by altitude)
⇖⇗	Wind system
⊏⊐	Tropical (one rain season, one dry season).

Characteristics of climatic zones

a)   Equatorial/tropical climate:

•   Heavy and reliable rainfall of about 1500mm per annum is experienced throughout the year.

•   There are two rainfall seasons/peaks (double maxima) in a year.

•   The length of the days and the nights is almost equal throughout the year (equinox).

•   Humidity is always high due to high rate of evaporation.

•   The climate is both hot and wet.

•   It has a small annual temperature range of about $3^0 - 4^0$C.

- The rainfall is received throughout the year and is well distributed.
- Rainfall is mainly convectional resulting from high evaporation from lakes, rivers and forests.
- Rainfall mainly falls in the afternoon accompanied by lightning and thunder.
- Temperatures are high in this region and even throughout the year.
- The region is also characterized by dense cloud cover making both days and nights warm.
- Low pressure all year round due to high evaporation rates.

Economic activities carried out in equatorial climate regions

✓ Due to the existence of dense forests, wild life conservation has been made possible and this attracts tourists.

✓ Equatorial climate has also favoured the existence of numerous water bodies giving rise to fishing activities.

✓ The dense vegetation in equatorial regions harbours wild animals making hunting possible.

✓ The dense forests due to heavy rainfall and hot temperatures experienced in that region have favored lumbering activities e.g. in Mabira forest.

✓ Agriculture and forest products existing in equatorial region have made industrial growth possible.

✓ Growing of perennial crops like coffee, palm oil, cocoa and tea due to heavy rainfall received throughout the year.

✓ Charcoal burning due to existence of dense forest cover.

✓ Food gathering e.g. passion fruits due to thick forests with fertile and dump grounds.

Problems faced in equatorial regions

➢ Rampant occurrence of pests and diseases which attack man, livestock, crops and this has scared away settlements leading to low development rates.

➢ Heavy rainfall received throughout the year and existence of the dense forested regions has made the establishment of transport network very difficult.

➢ The region with its dense forests has made it difficult to exploit such areas leading to remoteness.

➢ The equatorial forests are commonly inhabited by robbers and this has constrained any attempts to the development of the region.

➢ The heavy rainfall received throughout the year has caused a danger of erosion especially in areas where agriculture is practiced.

➢ Heavy rainfall may also lead to flooding which destroys peoples' lives and property.

➢ Leaching of the soils due to heavy rains and erosion has also led to serious loss of soil fertility.

➢ High rate of weed growth hence increasing costs of farming and clearance of land.

Steps taken to improve conditions in equatorial regions

▪ Establishment of transport and communication networks such as roads to reduce remoteness.

▪ Ensure political stability by talking peace with the respective rebel groups so as to allow development to take place in the affected areas.

▪ Practice modern methods of agriculture such as application of both organic and in-organic fertilizers to check on the rate of soil fertility loss.

- Setting up processing and manufacturing industries to take up products from agriculture and forestry to minimize wastage.
- Use of herbicides to control growth of weeds.
- Market research so as to enable the farmers in the region to sell their agricultural produce.
- Provision of capital in form of soft loans to enable different activities like agriculture and lumbering.
- Planting of trees to control soil erosion.

Conditions leading to equatorial climate
➢ **Influence of trade winds** especially the south east trade winds which blow over the Indian Ocean causing inter- tropical convergence zone leading to heavy rainfall, high humidity along the equator.
➢ **Distance from the sea**: areas near water bodies e.g. Lake Victoria and Kyoga receive heavy rains due to on-shore and off-shore breezes hence equatorial climate.
➢ **Latitudinal location**: Areas along the equator experience hot and wet conditions due to inter-tropical convergence zone (ITCZ) formed when winds converge at the equator blowing from different areas especially over the Indian Ocean.
➢ **Ocean currents** especially the warm Mozambique currents that bring heavy rainfall along the equatorial belt of East Africa.
➢ **Man's activities** through afforestation & re-afforestation programs which lead to creation of green belts of vegetation leading to heavy rainfall along the equator.
➢ **Influence of vegetation**: Thick forests e.g. Mabira lead to rainfall formation through evapo-transpiration.

b) **Savannah climate:** it occurs between 5° to 15° north and south of the Equator. It's found in the broad zone between the equatorial climate and the hot desert.
Characteristics of savannah climate
- Rainfall varies in amount from 1000 mm near the equator and decreases towards the desert about 250 mm.
- Rainfall is mainly received in summer when temperatures and evaporation rates are high.
- The rainfall received in the region is convectional in nature coinciding with the over head sun.
- Receives single maxima of rainfall i.e. one peak.
- Annual temperature range is moderate ranging between 7°C – 9°C.
- Humidity is relatively high throughout the year due to high evaporation rates.
- The region experiences a low cloud cover generally though the cloud cover is a bit dense during the summer seasons.
- Alternate wet and dry seasons are experienced.

Economic activities that can be carried out in savannah regions
❖ Crop growing i.e. Annual/seasonal crops are grown e.g. maize, millet, groundnuts beans, and cotton due to seasonal rainfall.
❖ The natural vegetation in the savannah consists of mainly grasslands that favour livestock rearing.
❖ Lumbering has also been carried out in savannah from the woodlands.
❖ The Savannah grasslands provide a natural habitat for many species of wild life which forms the basis for the tourism industry.

❖ Due to agriculture that takes place in the savannah, development of processing and manufacturing industries has been made possible. E.g. grain mills, ginneries for cotton, milk processing plants e.t.c.

❖ Charcoal burning and extraction of wood fuel also has been favored in the savannah due to the existence of woodlands.

❖ Hunting of animals has also been favored in the savannah due to the existence of the wild animals.

❖ Bee keeping can also survive in the savannah woodlands.

Problems faced in savannah regions

- Low and unreliable rainfall which leads to crop failure after planting.
- Shortage of adequate pasture for the livestock especially during the dry season forcing people to live a pastoral life.
- Large herds of livestock are kept which leads to over stocking, over grazing and eventually soil erosion.
- Wide spread fire out break especially during the dry seasons which leaves the surface bare leading to erosion when the rain season begins.
- Occurrence of pests and diseases which affect the crops and livestock e.g. tsetse flies which spread sleeping sickness in human beings and Nagana in livestock.
- Poaching of wild animals and this has affected the tourism industry.
- The severe occurrence of drought conditions forces wild animals to migrate which affects tourism.
- Some savannahs have inadequate transport and communication net work which has led to remoteness and low levels of economic development.
- Inadequate capital to develop savannah regions.
- Growth of weeds during the wet season which makes crop growing very expensive.

Solutions to the above problems

✓ Use of chemical spraying to control weeds and pests.
✓ Provisions of soft loans to reduce shortage of capital for developing the regions.
✓ Encourage crop rotation to ensure soil fertility and high productivity.
✓ Construction of valley dams to store water for the dry season.
✓ Establishing ranches to act as demonstration farms for the pastoralists.
✓ Extending veterinary services to reduce animal diseases.
✓ Construction of roads to reduce remoteness of such areas.

(c) DESERT AND SEMI DESERT CLIMATE

This type of climate is mainly found in the sub-tropical belt. These areas include Karamoja, Turkana land and Chalbi desert in Northern Kenya.

Characteristics of desert and semi-desert climate

➢ They receive low and reliable Rainfall.
➢ Annual Rainfall total is below 250 mm per year.
➢ The region experiences hot temperatures above $30^{o}C$ throughout the year.
➢ The days are very hot while the nights are very cold due to absence of cloud cover.
➢ These regions experience low relative humidity because of the extreme dry conditions.
➢ They experience hot and dry conditions throughout the year.
➢ Rainfall is rare but torrential which leads to seasonal floods.

Factors that have led to desert type of climate
✓ Latitudinal location far away from the equator where rainfall is low and unreliable.
✓ Location on Eastern side of the continent where off-shore winds especially the North East trade winds lead to aridity.
✓ Absence of large water bodies in the interior hence reduced evaporation e.g. Chalbi desert.
✓ Rain shadow effect due to presence of Ethiopian highlands hence dry descending winds reaching Karamoja and Turkana land.
✓ Presence of scanty vegetation which limits evapo-transpiration leading to low rainfall totals.
✓ Presence of off-shore winds which blow parallel to the coast diverting moisture bearing winds from the land mass.
✓ Bush burning by pastoralists which leads to rise in temperatures.

Economic activities in desert and semi-desert climate
▪ Tourism due to the existence of numerous desert landforms that attract tourists e.g. sand dunes.
▪ Nomadic pastoralism due to existence of scanty pastures e.g. the Karamojong.
▪ Mining and sand quarrying e.g. gold in Karamoja although it exists in small quantities.
▪ Cultivation of drought resistant crops under irrigation e.g. cotton in Kasese.
▪ Bee keeping due to the existence of scattered trees.

Problems faced by people living in desert regions
❖ Inadequate/limited supply of surface water for livestock and human consumption.
❖ Shortage of pasture for livestock rearing leading to nomadism.
❖ Infertile soils which don't support crop growing.
❖ Low and unreliable rainfall which limits growth of crops and vegetation.
❖ Excessively high temperatures during the day making settlements difficult.
❖ Very cold nights due to absence of cloud cover.
❖ Desert areas are remote due to absence of road network.
❖ Limited supply of food leading to frequent famine.
❖ Sandstorms due to strong winds are common leading to loss of lives and poor visibility.
❖ Small population makes it difficult to provide social services.
❖ Temporary flooding due to torrential downpours.
❖ Overcrowding near oases, rivers and water points.
❖ Shortage of labor and market due to small and sparse population.

Solutions to the above problems
✓ Construction of valley dams to help store water for pastoralists.
✓ Irrigation farming to improve food production and reduce famine.
✓ Planting of trees to help in climate modification through rainfall formation.
✓ Use of machines especially where labor is not enough.
✓ Educating pastoralists about the dangers of bush burning.
✓ Extending social services to attract big population and encourage people to settle down.
✓ Resettlement of people away from congested areas e.g. oases and river valleys.
✓ Encouraging tourism to acquire revenue for development of social services.

(e)MONTANE CLIMATE: This is experienced in highlands and mountainous regions of East Africa. Examples of these areas include; Kikuyu land (Mt. Kenya), Chagga land (Mt. Kilimanjaro), Bugisu land (Mt. Elgon) and Kigezi land.

Characteristics of montane climate
* The temperature decreases with an increase in height or altitude.
* They receive relief or orographic rainfall mainly on the windward side of highlands.
* The tops of the mountains do not receive as much rain as the lower slopes.
* Where altitude exceeds 4500m above sea level, the areas are covered by permanent snow/glaciers e.g. Mt. Kenya, Kilimanjaro and Ruwenzori.
* The leeward slopes are often dry due to the rain shadow effect e.g. Kasese and Ankole-Masaka corridor.
* Lower slopes are warmer than higher slopes.

Economic activities carried out in montane climate
➢ Tourism due to existence of permanent snow and glacial features that attract tourists that brings in foreign exchange.
➢ Lumbering especially from the mountain forest favored by the heavy rains.
➢ Slopes that have fertile soil and receive heavy rains favor agriculture for food production especially on the windward side.
➢ Nomadic pastoralism especially on the lee ward sides of the highlands.
➢ Mineral exploitation due to occurrence of some mineral deposits in mountain rocks e.g. copper at Kasese.
➢ Stone quarrying which provides materials for road construction and building

VEGETATION OF EAST AFRICA

Vegetation is the general term given to all living plants of various categories i.e. the trees & grass that cover the earth's surface and those that grow in water. Biologically, vegetation is known as Flora. There are four major types of vegetation in East Africa which include; Equatorial /tropical rainforest, Savannah vegetation (woodlands and grasslands), Swamp or mangrove vegetation and Semi-arid/desert vegetation.

Factors influencing vegetation distribution in East Africa
1. **Climate:** tropical forests grow in areas that experience heavy and reliable rainfall of about 1500mm and above. They also thrive well where temperatures are high throughout the year e.g. Mabira and Budongo forests. The amount of rainfall reduces as one moves away from the tropical region and this has led to Savannah vegetation consisting of Savannah Woodland and Savannah Grass Land e.g. Miombo woodlands. Desert regions receive rainfall which is very low, hence shrub and dry bush are dominant e.g. in Karamoja and Turkana land.
2. **Altitude:** Tropical rain forests, mangrove forests and savannah vegetation thrive well on the low altitude areas e.g. Masai Mara while montane forests, heath and moorland thrive well on high altitude areas e.g. in Kabale.
3. **Drainage:** Areas with permanent and stagnant water have favored swamp vegetation as well as mangrove forest e.g. at the East African Coast. Areas with no permanent drainage features such as lakes and rivers tend to be very dry and these have a dominance of semi-arid vegetation e.g. Karamoja. Areas that are well drained have a dominance of savannah and tropical rain forests e.g. along mountain slopes.

4.   **Soils:** Areas with deep and well drained fertile soils tend to favor tropical forest vegetation. Areas with moderately fertile soils favor the growth of Savannah grasslands whereas very infertile areas will favor semi-arid vegetation and at times do not favor vegetation at all e.g. Karamoja region. The water retention capacity of the soil (soil porosity) will also influence vegetation. High water retaining soils e.g. clay soils lead to occurrence of swamp or mangrove vegetation e.g. along the coastal belts.

5.   **Biotic factors: s**ome areas that are infested with pests tend to scare away settlement creating favorable conditions for the growth of dense vegetation or savannah wood lands e.g. Miombo Woodlands of central Tanzania. Areas without pests attract settlements and lead to savannah grass land. Areas that are infested with locusts tend to have scanty vegetation because these insects destroy the existing vegetation.

6.   **Human activities:** Large areas of forested land have been cleared for timber to create room for settlement and cultivation which has resulted into forested areas turning into savannah grasslands. Large areas of savannah vegetation have been turned into shrubs and wood lands because of activities like over grazing, bush burning, charcoal burning e.t.c. Some areas have been left without vegetation because of human practices like monoculture and shifting cultivation e.t.c leading to semi-desert and desert vegetation. In areas where man has engaged in afforestation and re-afforestation activities, he has led to luxuriant tropical rain forests.

TYPES OF VEGETATION IN EAST AFRICA

The major types of vegetation in East Africa include;
- Equatorial / Tropical Rain forests.
- Savannah vegetation
- Swamp/mangrove vegetation
- Semi-desert / Desert vegetation
- Montane vegetation:
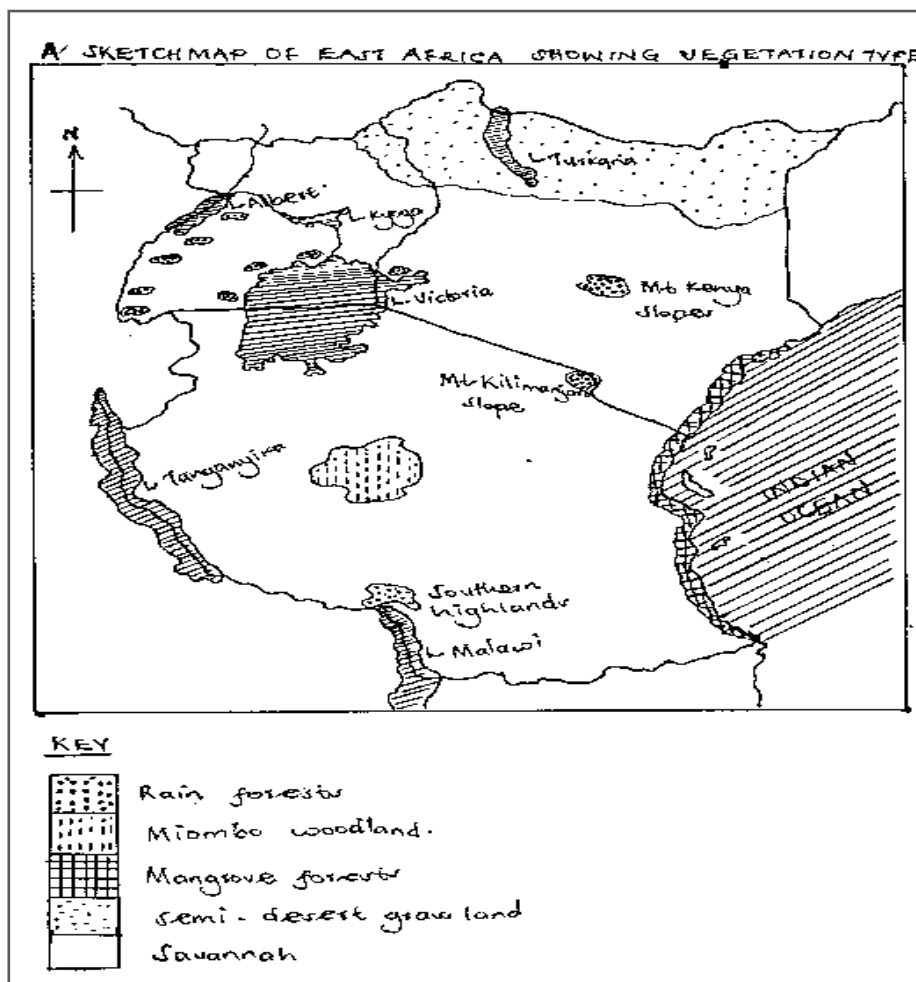
Characteristics of vegetation zones
  i) Equatorial / Tropical Rain forests.

- Trees have big trunks
- They are ever green through-out the year because of high rainfall.
- They have little or no undergrowth.
- Trees are very tall above 30-40 meters.
- Trees form canopies of about 3 different layers due to varying tree heights.
- Trees have many climbing plants (lianas) because of search for sunlight e.g. passion fruits.
- The trees mainly provide hard wood e.g. Mvule, Mahogany and Ebony.
- Trees have broad leaves.
- The trees have buttress roots to hold the huge tree trunks.
- Trees appear in impure stands.
- Forests are always thick i.e. impenetrable e.g. Bwindi impenetrable forest.
- Trees have a long gestation period of over 60 years.

ii) Savannah vegetation: it's divided into two i.e. grasslands which include; Queen Elizabeth National Park, Serengeti National Park, Kidepo valley National Park and Murchison Falls National Park and Woodlands which include; Miombo woodlands in Tanzania.

- Trees are ever green because of relatively high rainfall especially during the wet season.
- During the dry season, trees have brown leaves which they shade off to prevent loss of water (deciduous trees).
- Trees have got long tap roots in order to reach underground water.
- Trees are always scattered e.g. acacia.
- Grass grows up to 2m e.g. elephant grass.

iii) Semi-desert / Desert vegetation: Mainly found in areas that receive low rainfall below 750mm per year. Areas with this type of vegetation include; Turkana land, Karamoja region and Ankole-Masaka corridor.

- Trees are very short and usually stunted.
- Trees have very long tap roots to reach to the water level which is very deep.
- They have scattered bushes and thickets.
- Trees have thorny leaves e.g. lantana camara and baobab trees to prevent the animals from eating their leaves.
- Some plants have swollen trunks in which they store water to use during the long dry season e.g. Baobab.
- The plants have seeds that can lay dormant on the ground for a long time until the rain falls to allow germination.
- Many plants complete their life cycle within a few weeks before the soils dry up e.g. shrubs.

iv) Swamp/mangrove vegetation: In East Africa, swamps are found around water bodies e.g. around Lake Victoria and Kyoga, along the coast (mangrove swamps) and around the various rivers (Riverine swamps) e.g. River Kafu, River Katonga and River Nzoia. Some swamps are also found in Dombos (broad valleys) e.g. Awoja swamp in Soroti, Olwenyi swamp in Lira.

- Swamp vegetation is found in water logged areas.
- Vegetation is a mixture of mangrove trees, palm trees, coconuts and papyrus.

- The ground has a lot of mud and it's marshy.
- Trees are evergreen throughout the year.
- Trees are medium height usually less than 10m due to high temperatures.
- Trees grow close to each other making forests thick.
- Trees have fibrous roots and straight stems.
- Trees have broad leaves and are characterized by hard wood.
- Some trees have twisted stems/trunks

v) Montane vegetation: This occurs in mountain ranges and highland regions e.g. along Mt. Kenya, Elgon and Kilimanjaro. Due to varying altitude, the vegetation changes as one moves up the mountain as shown below.
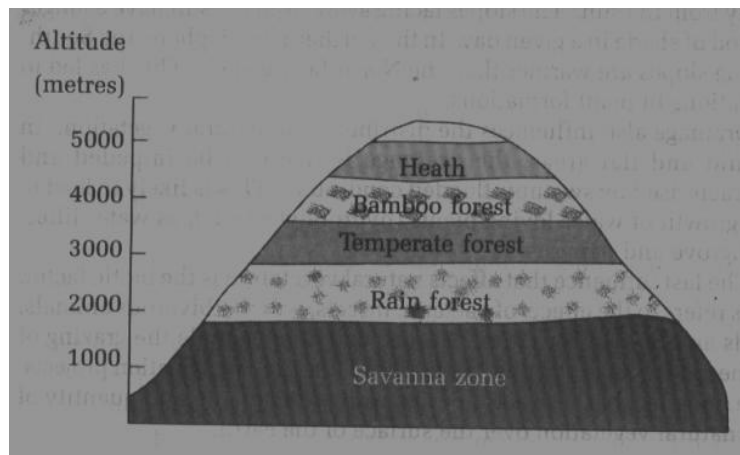
- *Savannah:* this is found at the lowest level of the mountain below 1000 meters and consists of dry grasses and shrubs. It's due to man's interference through clearance of tropical forests.
- *Tropical rain forests:* these are above savannah at an altitude between 1500 to 2500 metres. It consists of thick luxuriant and evergreen vegetation.
- *Temperate and bamboo forests: a*s altitude increases, the rainfall amount reduces and this gives rise to the temperate and bamboo forest which thrive well under cold conditions.
- *Heath and moorland: a*t the level between 3500 to 4500 m above sea level. The temperatures are very low as well as rainfall. Vegetation here consist of flowering plants, grasses and shrubs e.g. cedar and camphor.
- *Snow and bare rock: a*bove 4500 above sea level, temperatures are extremely cold thus the existence of snow and bare rocks. No vegetation grows at this level.
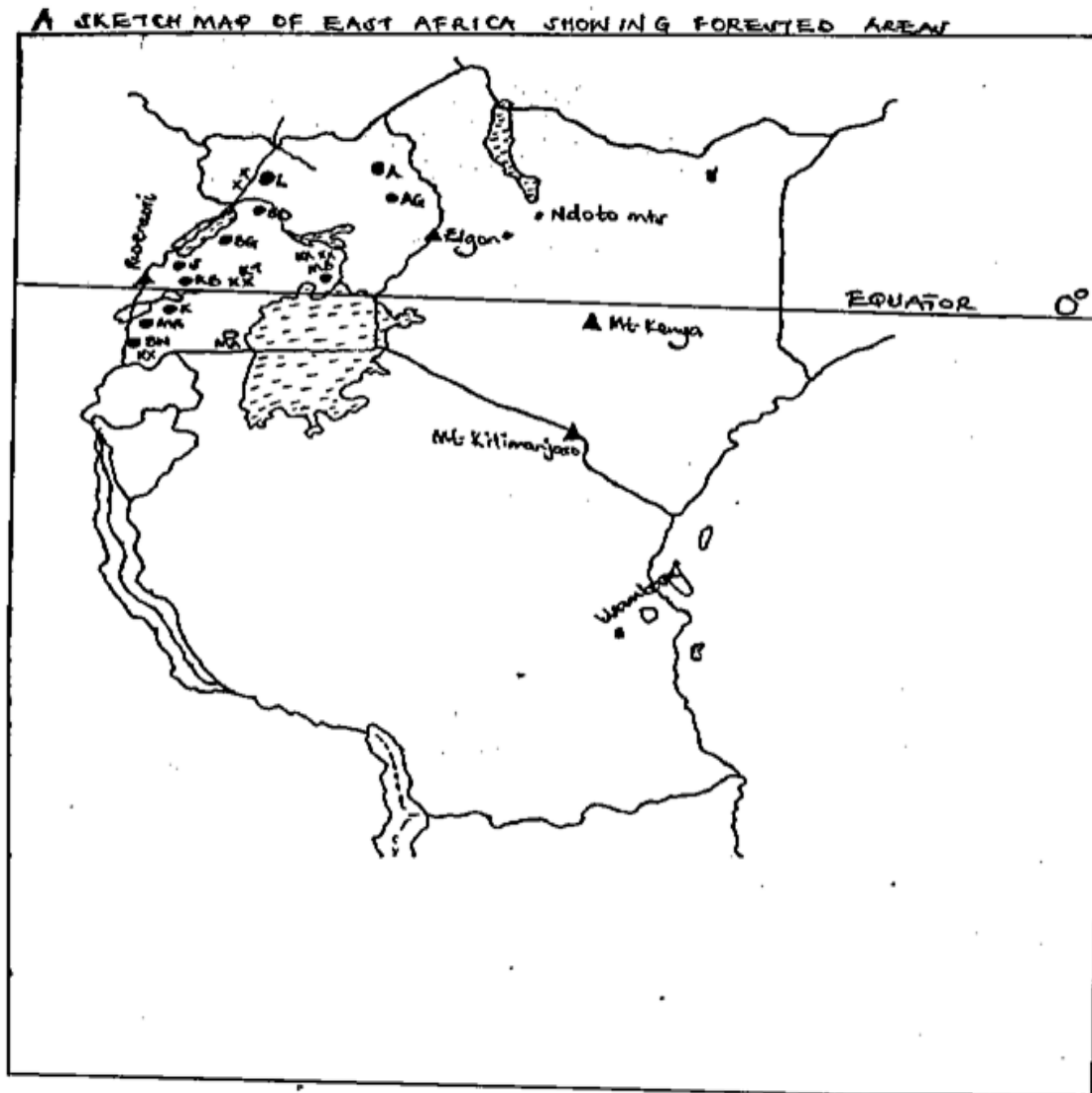
Characteristics of montane vegetation include;
➢ Altitudinal zonation of forest vegetation i.e. tropical forests at lower slopes, temperate slopes at mid-slopes, coniferous and bamboo slopes at higher slopes.
➢ Tropical forests (low altitude) are of mixed stand and have two layers of canopy.
➢ Tropical forests are of hard wood.
➢ Temperate, coniferous and bamboo forests are in pure stands and have single canopy.
➢ Temperate and coniferous forests are soft wood, have thick barks, cone shaped trees, needle shaped leaves, straight trunks and some species have hollow stems.

N.B: for the economic activities carried out, problems faced and solutions to problems faced, in a particular vegetation zone, refer to climatic zones as seen above.

FORESTRY IN EAST AFRICA

A forest is an extensive tract of land covered with a close stand of trees. It can be natural or planted by man with either hard wood trees or soft wood trees or both. Forestry is the science of cultivating forests and is also called tree farming.

A SKETCH MAP OF EAST AFRICA SHOWING FORESTED AREAS

KEY

▲ Montane forests

XX Planted forests

● Tropical lowland forests

S – Semliki
BG – Bugoma
BD – Budongo
A – Aber
AG – Agwata
MB – Mabira
KA – Katoogo
L – Lendy

MA – Malabigambo
BW – Bwindi
MR – Maramagambo
K – Kasyoha Kitomi
KB – Kibale
KT – Kateera

Conditions favoring the natural growth of forests

- Availability of extensive land with sparse population where forests grow with limited interference.
- Heavy rainfall of over 1500mm per annum for proper tree growth.

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- Reliable and well distributed rainfall throughout the year for proper maturity of the trees.
- Hot temperatures of about 20^0C- 30^0C for the proper growth of trees.
- High humidity level which is responsible for heavy rainfall that supports tree growth.
- Altitude especially at higher altitude where the population is small and temperatures do not favor human settlement hence leaving aside the land for forest growth.
- Supportive government policy of emphasizing afforestation and re-afforestation programs.
- Deep, fertile and well drained soils which support the growing of trees.
- Control of growing population to reduce on human interference with forests through settlement and agriculture.
- Abundant sunshine for the growth of natural forests.

Tree species in East Africa
1. **Hard wood trees:** These are mainly found in tropical rain forests e.g. Mabira, Budongo, Maramagambo, Bugoma, Kalinzu, Marabigambo and Bwindi. Examples include; Red heart, Musizi, Mvule, Mahogany and Ebony.
2. **Soft wood trees:** these are mainly planted forests. They include tree species like Eucalyptus, Pine, Cyprus and red cedar. They are mainly found in low lying areas e.g. Namanve.
NB: Montane forest also exists near the high mountains of East Africa e.g. Kilimanjaro, Kenya, Ruwenzori and the vegetation appears in zones.

Other important trees in East Africa include; wattle (soft wood tree) planted because its bark contains Tannin used in leather tanning industries.
- Pines are largely used for pulp and paper making e.g. at Webuye.
- Eucalyptus trees are not indigenous trees but are important for the provision of firewood, electric and fencing poles and paper and pulp.

Problems facing the forestry industry in East Africa
➢ Deforestation due to the increased need for land for agriculture and settlement.
➢ Wild animals graze freely in the forests leading to their destruction e.g. elephants.
➢ Wild fires caused by either lightening or careless farmers leading to loss of extensive forested lands.
➢ Scarcity of rainfall and prolonged drought due to increased desertification leading to short and stunted trees.
➢ Population increases hence the need to create more land for settlement leading to clearance of forested land.
➢ Limited alternative power sources have led to high demand for wood fuel and charcoal hence destruction of forests.
➢ Increased urbanization has led to destruction of forests e.g. road construction and industrialization.
➢ Mining and quarrying activities have also led to the destruction of forests due to the need to expose mineral bearing rocks
➢ Occurrence of tree pests and disease that attack specific tree species leading to their depletion.
➢ Long gestation of some tree species has also led to shortage of wood fuel.
➢ Inadequate labor force to carry out forestry management.
➢ Inadequate capital for investment in forestry management.
➢ The bulky nature of some tree logs makes it difficult to transport them to saw mills.

➢ Inaccessibility of some forests has made it difficult to exploit some of them.

➢ Corruption and embezzlement of forest funds by some forestry officials.

➢ Limited valuable commercial tree species which leads to importation that is very expensive.

➢ Insecurity and wars due to rebel activity has led to destruction of forests that are used as hide-outs for rebels.

➢ Unfavorable government policies e.g. giving forested land to private investors to set up plantations hence clearance of forests.

➢ Low levels of technology for exploiting forests e.g. use of axes and pangas.

➢ Hostility of local communities towards forest staff hence creating insecurity for the forest guards.

Solutions to the above problems

• Offering licenses to lumbering companies and individuals to reduce deforestation.

• Evicting encroachers on forested land e.g. the Bakiga and Balaalo migrants in Kibaale forest reserve were evicted by government.

• Formation of a ministry to supervise forests and other aspects of the environment i.e. Ministry of Lands, water & Environment.

• Setting up Non-Governmental Organizations to control environmental mismanagement e.g. National Environment Management Authority (NEMA).

• Training and equipping forest managers with modern skills on how to look after forests.

• Establishment of forest reserves where lumbering is prohibited e.g. Kibaale forestry reserve.

• Encouraging re-afforestation and afforestation programs e.g. cut one tree and plant two trees.

• Educating the masses about the dangers of deforestation.

• Practicing agro-forestry to ensure extensive tree growth by the farmers too.

• Encouraging the use of alternative sources of power e.g. solar energy to reduce forest destruction for wood fuel.

• Encouraging use of alternative building and construction materials e.g. plastics, metal and glass and reduce the demand for timber.

• Campaigning against degazetting forested land by government.

• Growing of quick and fast maturing species to ensure constant supply of forest products.

Effects of deforestation on the environment

❖ Reduction and lowering of water table due to reduced rainfall totals.

❖ Global warming and increased world temperatures due to reduced cloud cover.

❖ Mass wasting and soil erosion along the slopes due to absence of trees to trap the soil.

❖ Reduction of wildlife due to destruction of their natural which reduces foreign exchange.

❖ Loss of soil fertility due to severe erosion leading to low agricultural output.

❖ Desertification may arise leading to expansion of deserts.

❖ Flooding may occur due to mass wasting and soil erosion due to deposition of soil materials in the valley.

❖ Silting of river valleys due to increased erosion along slopes.

❖ Shortage of food leading to famine due to less agricultural output.

POPULATION IN EAST AFRICA

- Population refers to the number of people living in an area at a given time. Over 80% of the total population in East Africa depends on farming either directly or indirectly.

- Rainfall distribution and temperature as climatic factors play a big role in population distribution within East Africa because areas with heavy rainfall can support agriculture and therefore attract many people.

- On the other hand, areas with low and unreliable rainfall cannot support agriculture and these attract sparse population.

- Areas with **dense population** include shores of Lake Victoria, Kenya Highlands, Kigezi highlands, Slopes of Mountain Elgon and Ruwenzori, Southern Tanzania highlands such as Usambara ranges and areas around Lake Malawi, islands of Zanzibar and Pemba along the East African coast. The major towns and cities like Kampala, Nairobi, Dodoma, Dar-es-salaam, Mombasa, Kilwa, Tanga, Mtwara, Mbale, Kisumu, Eldoret and Nakuru have got dense population totals.

- Areas with **moderate population** density are between Kenya highlands and Nairobi and some parts of the rift valley in Kenya and Tanzania, northern Uganda in Gulu, Acholi land and Lira, western Uganda in areas of Hoima and Mubende.

- Areas with **sparse population** include North-Eastern Uganda covering areas of Kotido, Kitgum, Moyo and other areas of game reserves and forest reserves. Northern Kenya including Turkana, southern Tanzania, West and central Tanzania i.e. Miombo woodlands.

Concepts used in population studies

❖ **Over population:** This is a situation where the number of people in a given area exceeds the available resources.

❖ **Under population:** This is a situation where the number of people in a given area/country is less than the available resources.

❖ **Optimum population:** This is where the available resources are equivalent to the population for maximum resource exploitation.

❖ **Population density:** It refers to the number of people per square kilometer.

❖ **Life expectancy:** This refers to the average age at which most people die in a country. In East Africa, the life expectancy is 50years for women and 45years for men.

❖ **Population distribution:** This refers to the way people are spread out on the earth surface in a given area.

❖ **Population census:** This is the process of counting the number of people in the country or region. It's usually done after every 10years. The major purpose for population census is for government to plan and provide services for its people.

❖ **Fertility rate:** This refers to the average number of children per woman in her productive life. The fertility rate in East Africa is seven children per woman.

POPULATION DISTRIBUTION IN EAST AFRICA.

KEY

High population density

Moderate population density

Low population density
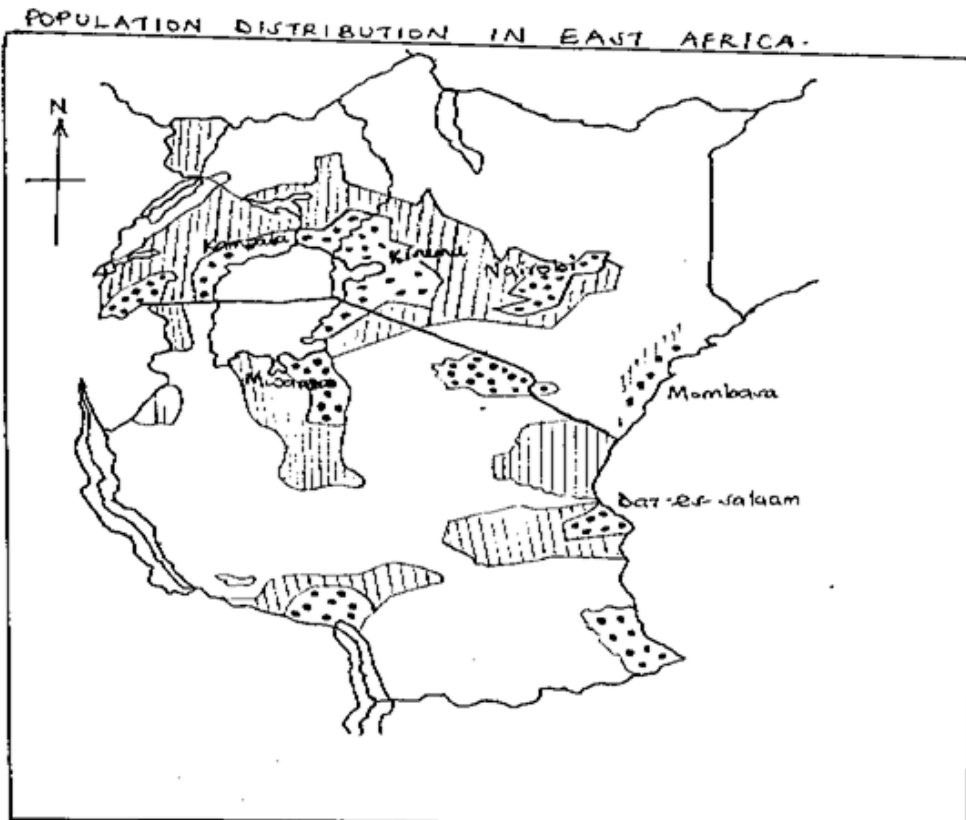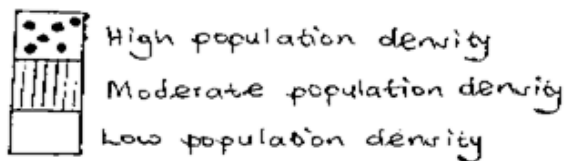
➢ **Climate:** Areas which receive heavy and reliable rainfall which support the growth of crops have attracted people in large numbers e.g. shores of Lake Victoria, Kenya highlands, slopes of Mt. Elgon and Kigezi highlands while areas which receive low and unreliable rainfall attract very few people e.g. Karamoja, Turkana land and Miombo woodlands.

➢ **Soils:** areas with deep and well drained fertile soils that support agriculture have attracted dense settlements e.g. Mbale, Kabale, shores of Lake Victoria while areas with infertile soils have sparse population e.g. Nyika plains, North Eastern Kenya and Masai land.

➢ **Altitude/relief:** areas with very high altitude e.g. top of Mt. Elgon and Rwenzori, Bundibugyo have sparse population because of the high pressure, difficulty in constructing houses and roads. However low altitude areas have attracted large settlements due to ease in constructing settlements and roads. However, areas in broad valleys occupied by swamps have sparse population due to presence of disease vectors like mosquitoes. Also, lowland areas are subjected to floods and therefore are always avoided.

➢ **Vegetation:** dense forests, bush lands and swamps are unfavorable areas for settlement because it's hard and expensive to clear the vegetation. They also habour wild animals and disease carrying vectors like tsetse flies which scare away settlements. Areas with savannah vegetation are easy to clear for agriculture and settlement hence attracting dense population e.g. Masaka, Mpigi and Mukono.

➢ **Natural water resources:** The existence of natural water resources can attract dense population e.g. shores of Lake Kyoga and Victoria. Also, in areas of low rainfall many people are attracted near water courses or rivers e.g. along river Athi, Nile because the dense population utilizes the rivers for small scale irrigation, livestock rearing and domestic use. However, areas without surface water bodies have scared away settlements leading to sparse population e.g. in Karamoja and Turkana land.

➢ **Drainage:** Poorly drained areas e.g. coastal margins of Kenya and Tanzania are full of mangrove swamps which are unproductive in terms of agriculture, therefore leading to sparse population while areas which are well drained have high population densities like central Uganda, slopes of Mt. Kenya and Elgon.

➢ **Economic Activities:** Areas that have activities like mining, trading and manufacturing industries especially towns likeDar-es-salaam, Nairobi, Kisumu, Kampala, Jinja attract large population than areas where they are few economic activities e.g. Karamoja. This because people are more attracted to areas that have enough job opportunities than areas with less employment opportunities.

➢ **Government policy:** The government may determine settlement in an area e.g. the creation of national park and game reserves discourages settlement e.g. Kidepo valley game park and on other hand, the setting up of resettlement schemes and refugee camps has attracted settlement in large number e.g. in Kiryandongo and Internally Displaced Peoples' (I.D.P) camps in Gulu.

➢ **Political stability:** Areas that are unstable and insecure have got low population e.g. Karamoja where there is a lot of cattle rustling compared to areas which are generally politically stable and secure hence attracting dense settlements e.g. towns like Kampala and Mombasa.

➢ **Culture:** some areas have got low population density because of their culture of e.g. Ankole, Karamoja, Masai land areas are sparsely populated because of their practice of nomadic pastoralism which keeps them on the move always. Within central Uganda, dense settlements exist because of the settled ways of life that encourage family development e.g. in Mukono and Wakiso districts.

N.B: Population growth: this refers to the natural increase in population. Uganda's population growth rate is 3% per annum/year. East Africa's population has been increasing over the years and this increase is due to the following factors;

(a) **Natural increase/ high birth rate:** in most areas of East Africa, the number of births in the year exceeds the number of deaths and such a difference has caused high population growth.

(b) **Improved medical services**: this has led to low infant mortality rate and death rates causing population growth.

(c) **Early marriages:** people tend to marry/get married at a tender age and this has led to a longer period of the child production cycle.

(d) **High fertility rate:** this refers to the number of children a woman can produce during her child bearing age. On average, African women give birth to 5 to 7 children and this has led to high rate of population growth.

(e) **Value attached to children:** many families value children especially girls as a source of wealth or boys as a source of labor and security. Others look at children as a source of insurance and help at an old age. They thus end up producing many hence leading to population growth.

(f) **Polygamy:** it refers to the act of marrying more than one wife. Polygamy is common because it is looked at as a sign of prestige in society and as a traditional obligation which has led to high population growth.

(g) ***Low levels of education:*** many people do not know the value of a small family. Besides, most people drop out of school early and end up into early marriages leading to production of many children.

(h) ***Religion***: Some religions encourage polygamy which has resulted into high birth rates especially among Moslems, while others religions are opposed to family planning methods e.g. Catholics.

(i) ***Poverty:*** many families can't afford to buy pills, condoms for family planning and this has led to many families producing children without birth control measures.

(j) ***Improved nutrition levels***: this has ensured balanced diet and steady supply of food which encourages people to have large families.

(k) ***Increased immigrations***: many people have entered East Africa from other regions e.g. Asians, Europeans, Sudanese and Congolese and this has led to population increase.

Advantages of high/large population size

➢ High population provides enough labor force for the economic development of the country.

➢ It can be a source of a large amount of taxes that avails the country with enough revenue for development.

➢ It is easy and economical to provide social services in a situation where many people are concentrated in the same area.

➢ In case of security, a large population can easily provide enough man power for the army/defense of a country.

➢ It is a source of cheap labor since many people are willing to work at a low wage rate.

➢ A high population encourages the exploitation of idle resources.

➢ A high population also provides a large market for goods and services within a given country.

➢ It also encourages a high level of innovation and invention as people try to look for survival in a competitive environment.

➢ It encourages increased agricultural output as people try to produce enough food for their own survival.

Disadvantages of large population size

▪ Shortage of land for settlement and farming leading to land fragmentation.

▪ Shortage of social services e.g. schools and hospitals.

▪ High government expenditure to provide social services for the people.

▪ High dependency ratio since much of the population is made up of children hence reducing investments and future savings.

▪ High rates of unemployment because of the less available jobs.

▪ Unemployment leads to high rates of crime and social unrest especially among the youths.

▪ Exhaustion of resources due to over exploitation.

▪ It encourages rural-urban migration and its evils like high crime rate, unemployment and drug abuse.

▪ Shortage of accommodation leading to development of slums.

▪ Shortage of food which results to famine and starvation.

▪ Overcrowding which results into congestion and poor hygiene hence easy spread of diseases.

▪ High cost of living due to competition for scarce resources.

- Poverty as a result of high dependency ratio.
- Environmental degradation through pollution, soil erosion, swamp reclamation and deforestation.
- Desertification/global warming due to pollution, deforestation and industrialization.

Steps being taken to solve such problems
✓ Encouraging family planning methods to reduce on the birth rates involving the use of pills, condoms and other contraceptives.
✓ Encouraging outward migration from the densely populated region to the sparsely populated areas.
✓ Setting up resettlement schemes for people from densely populated regions.
✓ Low enforcement policies are being emphasized to reduce the level of crime rates.
✓ Agriculture modernization has also been emphasized through the use of high yielding food varieties to increase food production and combat the problem of famine.
✓ Vertical expansion of towns and cities through building of storied buildings has been embraced to solve the problem of congestion in most African cities.
✓ Land reform policies like land consolidation are being emphasized to solve the problem of land fragmentation.
✓ Industrialization is also being encouraged in most African countries to reduce over dependence on the land and reduce the level of u employment.
✓ The governments are also trying very hard to establish enough social services such as health centres, schools and transport to contain the problem of congestion over these services.
✓ Encouraging monogamy to reduce polygamy.
✓ Rising the marriage age for girls to reduce early marriages.

LOW/UNDER POPULATION:

It refers to a situation where the number of people is less than the available resources within a given area.

Advantages of low/under population
❖ It avails enough land for agriculture and settlement.
❖ It minimizes the problem of congestion and overcrowding.
❖ Dependency ratio is low and this may encourage savings and investments.
❖ Less possibility of slum development since people are few.
❖ Less government expenditure on the provision of social services.
❖ Social conflicts over land are not likely to come up due to a low population.
❖ It avails people with enough food hence reducing the possibility of famine.

Disadvantages of low/under population
- Limited supply of labor.
- Small market size for goods and services due to low demand.
- It is expensive for the government to provide social services to a few users.
- It leads to low tax base hence low government revenue.
- It leads to under utilization of resources such as minerals and land.
- It leads to slow economic growth which leads to dependency on other countries for skilled labor and market.
- It limits the level of innovation and invention since most of the resources are not put to use.

POPULATION DENSITY:

It refers to the number of people living in an area per square km. In East Africa, some places have got high population density while others have got low population density.

Causes of high population density (why some areas have high population e.g. Shores of Lake Victoria, Kabale, Mbale and along the coast)

(a)   Hot and wet climatic conditions that favor the growth of various crops to support high population e.g. shores of Lake Victoria.

(b)   Presences of deep and well drained fertile soils which support farming also attract a large number of people e.g. Kabale and Mbale.

(c)   Availability of abundant supply water for both domestic and commercial use e.g. Kampala and Nairobi.

(d)   Presence of many industries that attract a large labor force e.g. in Jinja and Dar-es-salaam.

(e)   Availability of a variety of minerals such as Diamonds in Shinyanga and limestone in Tororo.

(f)   Urbanization attracts many migrants into large cities for social amenities e.g. in Dodoma, Kampala and Mombasa.

(g)   Easy accessibility due to well-developed transport and communication network for easy movement.

(h)   Availability of a relatively flat landscape which make settlement and development of infrastructures relatively easy hence attracting large settlements.

Causes of low population density (why some areas have low population e.g. Karamoja, Ankole-Masaka corridor, Masai land and Turkana land)

1.   Low and unreliable rainfall that cannot favor agriculture e.g. the desert region of Chalbi in northern Kenya.

2.   Hot temperatures of 30^0C and above that make it impossible for many people to live in such areas e.g. in Karamoja.

3.   Absence of surface water that is essential for human life e.g. in Masai land.

4.   Poor quality soils that can't support agriculture tend to scare away settlements e.g. Miombo woodlands.

5.   Pests and diseases such as tsetse flies and mosquitoes in some parts of central Tanzania scare away man due to fear of loss his life.

6.   Remoteness of the area that hinders accessibility due to poor transport and communication lines.

7.   Limited economic activities which mean that jobs are not existent.

8.   Limited social services which scare away people.
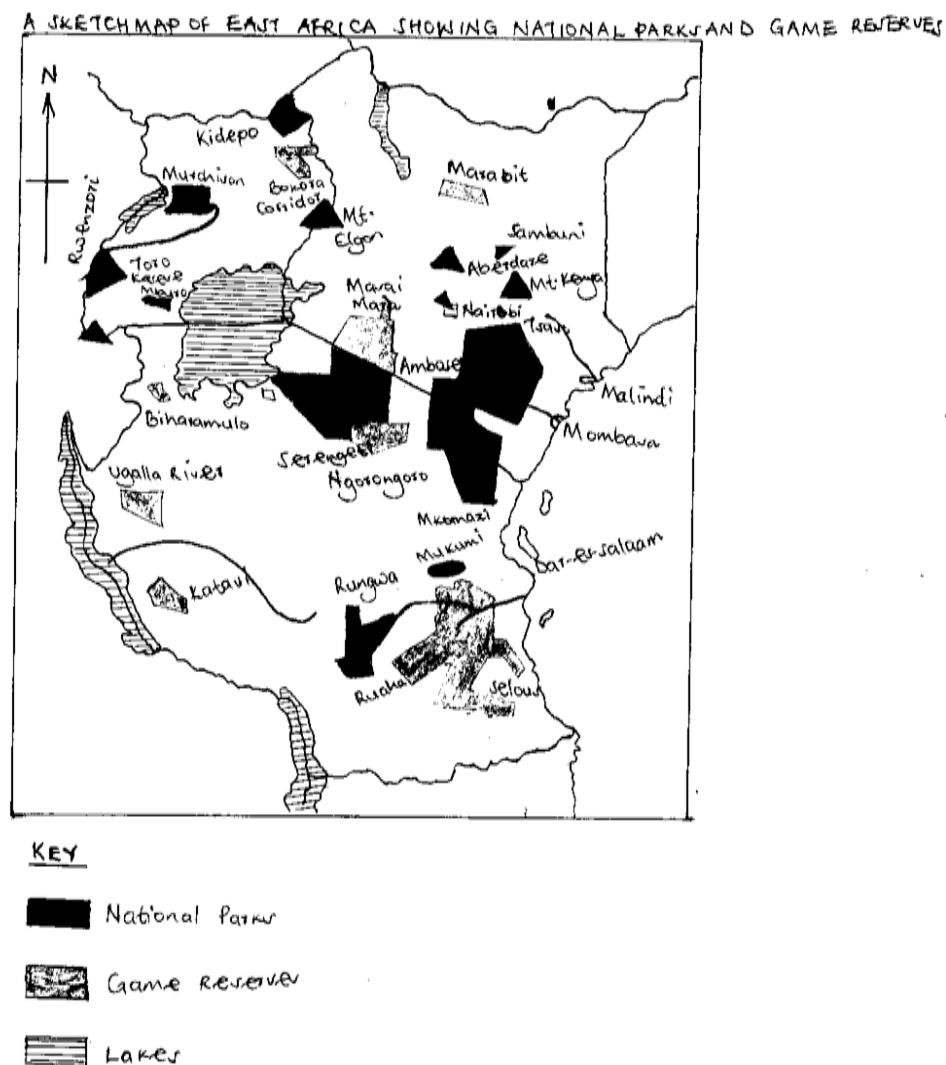

TOURISM IN EAST AFRICA

•   This is the practice for travelling for purposes of leisure, curiosity or study.

•   Tourism is the leading invisible export of East Africa and it's one of the major foreign exchange earners for the governments.

Tourist attractions/tourism potentials in East Africa include:

1.   Wildlife: this includes animals, vegetation and birds i.e. flora and fauna e.g. zebras, hippos, lions, flamingos, crocodiles, savannah vegetation, tropical forests e.t.c. these are conserved in national parks, game parks, game reserves like Queen Elizabeth, Serengeti, Kidepo Valley, Masai Mara, Mkomazi and Tsavo.

N.B wild life is the most important tourist attraction for East Africa.

2. Climate and other resources attached to it e.g. sports, sunbathing, conducive situations of swimming e.t.c. East Africa has got a number of climate types e.g. savannah, equatorial, Semi-arid, Swamp and Montane climate.

3. Relief features like high mountains e.g. Kilimanjaro, Kenya, and Rwenzori with snow at the top, and the rift valley plains.

4. Historical sites e.g. Nyero rock paintings in Kumi, Kasubi tombs, Olduvai Gorge, and Fort Jesus at Mombasa e.t.c.

5. Culture e.g. East Africa has got a number of cultures based on the different tribes e.g. the Masai, kiganda culture where people exhibit their cultures in different ways of dressing, eating.

6. Drainage systems e.g. East Africa has got a number of drainage systems ranging from lakes like Victoria and rivers e.g. Rufigi, Nile and Tana.

A SKETCH MAP OF EAST AFRICA SHOWING NATIONAL PARKS AND GAME RESERVES

KEY

■ National Parks

▨ Game Reserve

▤ Lakes

Factors favoring the development of tourism industry in East Africa

➤ The region is endowed with a variety of tourist attractions such as wild life, drainage features, historical sites and coastal landforms which all attract foreign tourists.

➤ Peace and stability especially in Kenya and Tanzania and some parts of Uganda which has ensured that the tourists are sure of their safety.

➤ Improvement in the transport network system especially roads, water ways and air transport has facilitated easy movement of tourists to their areas of interest.

➢ Increased level of advertisement to outside countries is being done through embassies abroad through international Television channels, magazines, radios which have made tourists aware of what is in East Africa.

➢ Local people of East Africa provide good hospitality for the tourists which also attract foreign visitors because they are assured of good care and warm welcome.

➢ Improv,ement in the accommodation facilities e.g. hotels, lodges, and guest houses which have provided residential services to tourists.

➢ Increased level of education given to the local people has created more awareness and appreciations for the tourism industries e.g. courses related to tourism have been introduced at different institutions within East Africa e.g. Bachelor of Leisure and Hospitality Management.

➢ Presence of adequate capital from local and foreign individuals to invest in the sector e.g. for construction of hotels.

➢ Favourable government policy which encourages investment in tourism e.g. liberalization of the tourist sector, low taxation and increased subsidization of investors in the tourism sector.

➢ Availability of enough skilled and unskilled labour force to work in the industry e.g. hotel managers and game rangers.

Importance of tourism in East Africa

• Tourism is an invisible export which earns the government foreign exchange used for development of infrastructures e.g. roads.

• Tourism leads to development of international relationships which help in promoting world peace and establishing world unity.

• Tourism helps to conserve environment and protect natural beauty which is important for the present and future generations.

• It has created employment opportunities to the people of East Africa leading to improved standards of living e.g. game rangers, tour guides, travel agents e.t.c.

• It has facilitated the development of infrastructures like roads which help in the movement of goods and services in East Africa.

• Government earns revenue through taxation of people who work in the tourism industry used in the development of roads.

• It has led to the development of art and craft industry because the locally made items like drums, baskets mats are sold to foreign visitors.

• It helps to diversify the economy hence reducing dependence on agriculture ensuring constant capital flow.

• It helps to put idle land to good use hence reducing resource wastage e.g. Kidepo valley national park.

REASONS WHY KENYA'S TOURISM INDUSRTY IS MORE DEVELOPED THAN THAT OF OTHER EAST AFRICAN COUNTRIES

➢ Kenya is endowed with a variety of beautiful scenery in form of coastal land forms, volcanic features as well as coastal towns like Mombasa which attracts many tourists.

➢ Kenya has had a longer period of political stability which has attracted more tourists than Uganda and Tanzania.

➢ Kenya has various National parks and game reserves like Tsavo National Park that are well distributed throughout the country hence attracting a large number of tourists.

➢ Kenya's national parks are blessed with many well trained guides who encourage more tourists to go to Kenya.

➤ Kenya has a well-established Hotel industry that is well managed and services are of high standards than in other East African countries.

➤ The government of Kenya through the Kenya Tourist Development Co-operation ensures strict wild life preservation programs and laws which ensures continuity of the activity.

➤ Kenya has a well-developed transport system in terms of roads, railways and air transport making it easy for the tourists to move within the country.

➤ A lot of research is carried out by the Kenya Tourism Development Co-operation in terms of checking the population of animals and birds in National parks and Game reserves as well as improving the management of the entire tourism industry.

➤ Kenya lies along the coast of East Africa which is easily accessible by the tourists from Europe, Asia and U.S.A.

➤ Kenya introduced a new system of travel known as package holiday since 1970 which ensures that tourists are given subsidized rates hence attracting many more.

PROBLEMS FACING TOURISM INDUSRTY IN EAST AFRICA

▪ Poaching of wildlife has reduced the number of animals in National parks and Game reserves yet they are East Africa's major attractions.

▪ Inadequate supply of skilled man power to handle wildlife and hotel management which therefore makes service provision very poor hence chasing away tourists.

▪ Inadequate capital for investment to set up roads, good accommodation facilities and to carry out research.

▪ Hostile tribes in East Africa e.g. the Masai and Karamojong scare away some of the tourists which limits the number of tourists that flow into East Africa.

▪ Low levels of advertisement which has made people unaware of the existence of tourist attractions in the countries hence reducing on the number of intending visitors and tourists.

▪ The high population growth rate which has resulted into increased demand for land leading to deforestation hence destruction of habitats for wildlife.

▪ Political instabilities in some parts of the East African countries have scared away tourists.

▪ Pests and diseases e.g. tsetse flies, mosquitoes which carry diseases like sleeping sickness, malaria for humans hence scaring away tourists and also reducing on the animal population.

SOLUTIONS TO THE PROBLEMS

✓ Eviction of encroachers and reduction of human settlement within the surroundings of the game reserves and National parks to reduce poaching.

✓ Setting up of anti-poaching squads to reduce on poaching to increase the animal population.

✓ Regular patrols and supervision should be done to protect the animals from poachers.

✓ Increased advertisement should be done through radio programs, TVs, Newspapers, magazines both within and abroad to increase on the level of awareness about tourism potentials within the region.

✓ The government should improve on the accessibility of tourist potentials e.g. Rehabilitation of roads for better transport.

✓ Educating the local people about the values of wild life and environmental conservation to reduce on the level of poaching and deforestation.

✓ Encouraging the local people to use family planning methods so as to control population growth and reduce the negative effects like deforestation.

✓ The government should fight corruption so that the resources allocated to the tourism industry are put into proper use.

AGRICULTURE IN EAST AFRICA

Agriculture is the practice of growing crops and rearing of animals. In East Africa, there are various systems of agriculture which are sub-divided into traditional systems and modern systems.

i. **Traditional/subsistence farming systems** mostly practiced in East Africa include nomadic pastoralism, shifting cultivation, bush fallowing and free range system.

ii. **Modern systems** include plantation farming, market gardening, irrigation farming, cattle ranching and poultry farming e.t.c.

a) **SUBSISTANCE FARMING:** This refers to all systems of agriculture where farmers grow crops and rear animals for their own consumption and it is only when there is surplus, when selling can be done. It's subdivided into the following systems of agriculture;

1. **SHIFTING CULTIVATION**: This system is sometimes referred to as **slash and burn** farming system. It is a system where farmers clear the vegetation, plant crops and upon realizing that the soil has lost its fertility, the land is abandoned and farmers go to another fresh area.

CHARACTERISTICS OF SHIFTING CULTIVATION

i. Scientific methods of farming are not used.

ii. It employs only family labour because it's on small scale.

iii. Traditional tools like hoes, pangas, digging sticks, axes and fire are used.

iv. Food crops are mainly grown for home consumption e.g. potatoes, cassava, maize and sweet potatoes e.t.c.

v. Farming is carried out on a small scale hence low output.

vi. Farmers keep on moving from one place to another once soil has lost fertility and they don't come back.

vii. Farmers do not set up permanent houses because they keep on moving.

viii. Farming is practiced in sparsely populated areas with no permanent ownership of land.

ADVANTAGES OF SHIFTING CULTIVATION

a. Provision of food especially for small families.

b. The surplus can be exchanged on barter basis e.g. farmers obtain what they have not produced through exchange with their neighbors.

c. Soil erosion is not serious because it's only a small piece of land which is cleared.

d. Many crops are grown on the same piece of land which leads to high crop yields and reduced soil erosion.

e. Farmers shift to better areas if there are more pests and diseases on the present land they occupy.

f. Less capital is needed for investment.

DISADVANTAGES

a.   Low output is realized due to operation on a small scale.

b.   Soil erosion is always experienced especially after bush burning and clearing.

c.   Areas where shifting cultivation is carried out are always underdeveloped.

d.   It can't be carried out in areas with dense population.

e.   It leads to deforestation which retards the growth of forestry industry.

1.   **BUSH FALLOWING:** This is another form of subsistence farming except that for bush fallowing, farmers stay in one place. Farmers leave the land under fallow (rest), to regain its fertility under the bush so that it can be re-used after some time. The length of the fallow period depends on population density. This practice is common in areas of Buganda, Teso and Kondoa district (Miombo woodlands among the Wagogo people).

Characteristics of Bush fallowing

- Farmers settle in one place but they keep on rotating fields around the same homestead.
- There is permanent ownership of land.
- Food crops are mainly grown but of recent some cash crops have been introduced e.g. vanilla, cocoa e.g. in Mukono.
- Traditional tools are used e.g. hoes, pangas, digging sticks e.t.c.
- There is construction of permanent houses because farmers don't move around.
- Some scientific methods are used e.g. application of fertilizers.
- The rotation of fields depends on the size of the land owned and the population density in that area.
- Family labor is mainly used.
- Little capital is invested by the cultivators.

Advantages of Bush fallowing

➢   Provision of food capable of sustaining relatively big population.

➢   Reduces chances of soil erosion due to minimum application of scientific methods.

➢   Areas where bush fallowing is carried out are more developed than those where shifting cultivation is applied.

➢   It requires less capital since traditional tools are used.

➢   The surplus can be exchanged for income hence improving on the standards of living for farmers.

➢   Under bush fallowing, farmers can be able to grow perennial crops e.g. vanilla and coffee which is grown in Central Uganda e.g. Mukono.

➢   The soil under the fallow is left to regain its fertility which increases the crop yields.

Disadvantages of bush fallowing

▪   It depends on nature and which results into low crop yields in case of low rainfall and hot temperatures.

▪   With the increasing population in East Africa, the demand for land has gone high and bush fallowing stands higher chances of drying out.

▪   It's a backward farming system which is not economically viable because it's mainly food crops which are grown.

▪   It encourages land fragmentation which causes land disputes, soil erosion and low output.

N.B due to population increase in East Africa, the traditional farming systems are slowly dying out or disappearing.

3. **NOMADIC PASTORALISM:** This is another form of subsistence farming where farmers rear animals while moving from one place to another in search of water and pasture. Nomadic pastoralism is practiced by the Karamojong, Turkana, Bahima, Galla, Boran, Iteso and the Masai.

N.B the Masai practice **Transhumance** which is another form of nomadism which involves moving from highland areas to low land areas in search of water and pasture. Transhumance is a form of subsistence farming where a farmer grazes his livestock down the slope and when the pastures are over, he grazes on the top slope and then down. It is practiced in highland areas especially around Mt. Kilimanjaro e.g. Machakos and near the Serengeti plains.

Characteristics of Nomadic pastoralism

❖ It's practiced in sparsely populated areas e.g. North East Uganda and Northern Kenya.

❖ They occupy dry areas of East Africa which receive low rainfall of about 300 - 400mm per annum and temperatures are constantly hot e.g. over 30^0c.

❖ They keep on moving from one place to another in such for water and pasture.

❖ Land is owned communally i.e. there is no individual ownership of land.

❖ They set up temporary huts or settlements because they are always on the move e.g. the Manyattas of the Masai.

❖ They mostly keep local breeds of animals e.g. Ankole long-horned cattle, zebu, Borane.t.c.

❖ Cattle rustling i.e. stealing cattle from one another are part of their culture.

❖ Crop growing isn't part of their culture but small scale farming is carried out and crops grown include millet, sorghum and cassava.

❖ Nomadic pastoralists keep large numbers of animals because they believe in quantity but not quality.

❖ The natural vegetation in areas occupied by nomads is always open grasslands and sometimes woodlands which is infested by tsetse flies.

Problems faced by nomads in East Africa

• Cattle rustling which leads to insecurity, loss of lives of the nomads and animals and destruction of property.

• They graze their animals communally which accelerates easy spread of diseases e.g. Nagana, sleeping sickness, East coast fever, foot and mouth disease e.t.c.

• They always burn the vegetation in anticipation of better pasture during the wet season but when the rain comes, the bare soil is eroded.

• Nomads over graze the land for years which exposes it to agents of soil erosion and hence soil exhaustion.

• Low rainfall which leads to shortage of drinking water especially during the dry season.

• There is a problem of tsetse flies which spread Nagana and sleeping sickness to animals and people respectively.

• Lack of storage facilities like refrigerators to store milk and houses for milk collecting centres and processing milk.

• Animals are fed on natural pastures which are of poor quality leading to unhealthy conditions for the animals hence low quality output.

• Cultural rigidity or conservativeness, whereby the farmers do not attain any changes regarding to better farming methods.

- Areas occupied by nomads are neglected by governments hence leaving pastoral areas to lag behind in terms of development.
- There is frequent occurrence of famine due to inadequate food supply.
- Wild animals e.g. lions and leopards attack their animals e.g. the Karamojong near Kidepo valley national park.
- Land disputes are becoming common especially with crop growers whose farms are destroyed by the wandering animals.
- Nomads walk for very long distances in their bid to search for water and pasture for their animals.
- Population increase and land ownership have led to reduction grazing areas for nomads.
- Remoteness or inaccessibility due to poor transport has led to limited market for the animals and their products.
- Government neglect has led to limited veterinary services hence increased disease outbreaks.

SOLUTIONS TO THE PROBLEMS
✓ Emphasizing massive education to teach the pastoralists about the values of modern farming and living a settled life.
✓ Encouraging individual land ownership to reduce on overgrazing and its effects e.g. soil erosion.
✓ Construction of boreholes and valley dams to provide water to pastoralists during the dry season to reduce on their movements.
✓ Infrastructural development e.g. roads, hospitals to reduce remoteness of pastoral areas.
✓ Establishing of markets and milk processing plants near the pastoral areas to enable them sell their animal products.
✓ Extending the veterinary services e.g. cattle dipping to pastoral areas to fight pests and diseases.
✓ Encouraging pastoralists to grow some crops to diversify their economy and also fight famine.
✓ Encouraging free and accessible education to fight illiteracy and hence change their beliefs for modern farming.
✓ Formation of co-operatives so that they can acquire loans and market for their products.
✓ Practicing ranching and paddocking to control over grazing.
✓ Setting up anti-theft units to improve security hence reducing cattle rustling.
✓ Diversification of the economy e.g. through tourism to ensure constant capital inflow for government.
✓ Practicing cross-breeding to improve on animal breeds for better yields.
✓ Using quarantine or restricting animal movements to reduce the spread of animal diseases.
✓ Carrying out scientific research to introduce quality pasture for animals to improve on output.
✓ Setting up anti-stock units to reduce over stocking and number of animals kept hence reducing soil erosion.

Importance of nomadic pastoralism to the economy of East Africa
➢ Source of human food with valuable proteins e.g. milk, meat/beef and blood.

➢ It's a source of income to the pastoralists by selling farm products hence improving on their standards of living.

➢ It's a source of employment e.g. through trade hence providing a livelihood for many people.

➢ It's a source of government revenue for setting up roads through taxing livestock transporters and dairy factories.

➢ The government earns foreign exchange used for setting up hospitals by exporting animal products e.g. hides and skins.

➢ It has helped to diversify the economy of East Africa hence ensuring constant capital inflow and reduced dependency on crop growing.

➢ Nomadic pastoralism has provided raw materials for industries which provide jobs e.g. meat packers and leather tanning industry.

➢ It has helped to put idle land into use hence reducing resource wastage e.g. Karamoja region.

➢ Animals are used as beasts of burden e.g. for transport and for pulling ox-ploughs hence promoting farming.

➢ Animal wastes are used as a source of fuel e.g. cow dung is used for bio-gas hence offering alternative source of energy.

➢ Source of wealth for social and economic status e.g. bride wealth hence promoting cultural conservation.

Why Nomadism has persisted

▪ Areas occupied by nomads are sparsely populated hence providing enough land for communal grazing.

▪ The areas are remote and located far away from centers of modernity leading to sparse population.

▪ The areas receive low and unreliable rainfall which can't support crops but can sustain pastoralism.

▪ Governments have deliberately ignored development in pastoral areas hence leaving them in their ways of life.

▪ The infertile sandy soils in these areas discourage crop growing but can support growth of pastures hence pastoralism.

▪ Cultural rigidity of the nomads makes them argue that it is the best way to live their lives.

▪ Low levels of education and ignorance has made nomads reject new methods of animal rearing.

▪ Presence of short savanna vegetation/grass lands which is open and favours movement of pastoralists without much forest vegetation.

▪ The gently sloping relief of the areas they occupy, makes it easy to move with their animals from one place to another.

RANCHING IN EAST AFRICA

It's the rearing of animals purposely for the production of meat. Ranching schemes are set up by government to act as demonstration farms to the nomadic pastoralists.

Examples in East Africa include;

• Kaputiel ranching scheme in Masai land.

• Ankole – Masaka ranching scheme among the Bahima.

• Aswa ranching scheme in Acholi.

• Agago ranching scheme in Karamoja.

- Singo and Buruuli ranching scheme for Peasants in Luweero and Nakasongola.
- Kongwa ranching scheme in Gogoland (Central Tanzania in Kondoa region).

PASTORAL AREAS IN EAST AFRICA.

KEY

⬭ Ranches

■ Irrigation schemes

∴ Pastoral areas

1. ANKOLE – MASAKA RANCHING SCHEME:

➤It's located in Mbarara, Masaka, Rakai, Sembabule and Lyantonde districts.

➤The Bahima pastoralists are the beneficiaries of the scheme.

➤This area receives unreliable rainfall and the dry seasons are longer than the wet seasons.

➤Work on the scheme began in 1960 when rinder pest killed over 90% of the animals owned by the Bahima.

➤Wild animals were also killed because they acted as hosts of tsetse flies.

➤In 1963, spraying using insecticides began and bushes along the Mbarara – Masaka road were cleared.

➤A research station was set up at Ruhenge to cater for cross-breeding between Red Poll, Angus, Zebu, Ankole long-horned cattle and Boran.

➤A pasture station was set up at Muko to improve on the grass for feeding the animals.

➤A market was set up at Sangu along the Ankole-Masaka highway to encourage the Bahima to sell their animal products.

BENEFITS OF THE RANCHING SCHEME
✓Weed killers have been applied to remove the unwanted plants.
✓Leguminous grass has been planted which is nutritious for the animals to replace the unwanted spear grass from the ranches.
✓Meat and milk collecting centers have been set up to encourage Bahima to sell the animal products.
✓Veterinary services have been brought nearer to the pastoralists.
✓Farmers have been encouraged to sell off some of their animals to control spread of diseases.
✓Efficient transport systems have been developed to enable the farm products reach the urban market.

2.   KONGWA CATTLE RANCH:
❖   This was formerly a **ground nut scheme** occupied by the Wagogo people.
❖   The area had very hard dry soils during the dry season and very wet soils in the wet season.
❖   Bushes were only cleared in the wet seasons because that is when all the roots could be uprooted.
❖   Today, the Kongwa ranching scheme is under the National Agricultural Company Limited with eight big ranches on 340,000 hectares with over 70,000 heads of cattle.

3.   KAPUTIEL RANCHING SCHEME:
▪ It is a developed scheme within Masai land South East of Nairobi bordering river Athi.
▪   The Masai occupy a dry Savanna stretch from the Narok district of south-west Kenya to the Masai steppe of North East Tanzania.
▪ The ranches are not fenced but surrounded by ditches separating the different clans.

Benefits of the Scheme
• Cross-breeding has led to improved animal breeds which give off a lot of milk.
• Dipping of animals has also helped to control pests and diseases.
• There is improved water supply for the Masai animals through the construction of valley dams.
• Extension veterinary services are provided to provide assistance to the Masai against animal diseases.
• Schools were built and a few Masai children go to school.
• In Tanzania, a project called Masai development plan was introduced to improve the life of the Masai by putting in placeranches.
• Wheat growing, sheep and goat rearing have been introduced inNandi districts to encourage them to grow some crops.
• Aerial spraying and bush clearing have been introduced in major lands to control tsetse flies and create more land for farming.
• The Masai cultivators are given incentives by the Kenya government to fence and cultivate their land.
• Roads, banks and hospital facilities have been introduced to improve their standard of living.

PLANTATION AGRICULTURE IN EAST AFRICA

❖ It refers to the commercial farming where cash crops are grown on a large scale specifically for sale.

❖ Crops that are grown under plantation agriculture include; sugarcane, tea, sisal, coffee, pyrethrum, cloves, bananas and oil palm.

❖ The major plantations in East Africa include Kakira in Jinja for sugarcane, Lugazi (SCOUL) for sugarcane, Kasaku tea estate near Lugazi, Kericho tea estate, Mwea-Tebere for rice, Mumias for sugar, Kibimba (Tilda Uganda Limited) for rice, Kilombero for sugarcane and Morogoro sisal estate and Zanzibar clove estate.

Characteristics of plantation farming

➢Cash crops are grown on a large scale e.g. range from 105-1000km^2 of land.

➢It involves use of machines e.g. combined harvesters, collecting trucks, ploughs and tractors.

➢Monoculture is mainly practiced i.e. growing a single crop on a large area.

➢It involves use of abundant skilled and unskilled labor force.

➢It involves use of scientific methods e.g. spraying and irrigation.

➢It requires large capital input for buying large chunks of land, machines and paying workers.

➢The land must be flat or gently sloping to favor the establishment of plantation farms and mechanization.

➢Crops grown are mainly for sale and export.

➢They provide social services to workers e.g. schools, hospitals, recreational facilities and houses to ensure high productivity.

Benefits of plantation agriculture

▪ It has led to development of infrastructure e.g. roads, schools, hospitals leading to urbanization.

▪ They employ many workers leading to improved standards of living.

▪ They increase on the tax base for government hence increased revenue used for developing roads.

▪ Foreign exchange is obtained from the exportation of the products used for developing hospitals.

▪ Leads to industrial growth through provision of raw materials especially to agro-based industries e.g. Kakira sugar works.

▪ Plantation farms provide market for the out growers' produce hence ensuring constant flow of income.

▪ Plantation farms encourage research leading to improved and better quality crops.

▪ Acquisition of skills by workers which helps them to ensure continuity on the job.

Disadvantages

• It encourages rural-urban migration and its effects like unemployment, high crime rate and slum development.

• It leads to displacement of people from their own land hence leaving many people landless.

• It has reduced on the vegetation cover in East Africa leading to desertification e.g. clearing of Mabira forest by SCOUL.

• Monoculture practiced by farmers on plantation leads to soil exhaustion and erosion hence loss of soil fertility.

• They require large capital (capital intensive) yet majority of people in East Africa are poor leading to foreign ownership.

• There is increased multiplication of pests and diseases due to monoculture on these plantations.

• Profit repatriation as most for the plantation farms are owned by foreigners leading to less local development.

Note: Out growers are farmers adjacent to plantations who grow similar crops as those grown on plantations and they therefore sell their crops to the plantation owners.

IRRIGATION FARMING IN EAST AFRICA

❖   Irrigation is the artificial adding of water to the soil.

❖   Irrigation schemes in East Africa are both small and on large scale.

❖   They are found in both dry and wet areas in East Africa.

Examples of irrigation schemes in East Africa include;

| Country	Irrigation scheme	Source of water for irrigation	Crops grown
Uganda	1. Doho (Manafwa district)	River Manafwa	Rice (major)
	2. Kibimba (Bugiri district)	River Kibimba	Rice (cassava)
	3. Mobuku (Kasese district)	River Mobuku& Sebwe	Cotton, maize, rice
Kenya	1. Ahero pilot scheme(Kano plains in Western Kenya)	River Nyando	Rice
	2. Galole pilot scheme	River Tana	Cotton
	3. Mwea-Tebere	River Thiba, Tana&Nyamindi	Rice
	4. Mumias	River Nzoia and River Khaleba	Sugarcane
Tanzania	1.Kilombero	River Kilombero and Ruaha	Sugarcane

REASONS WHY IRRIGATION IS CARRIED OUT IN EAST AFRICA

• In many parts of East Africa, rainfall is inadequate hence the need for adding water artificially e.g. in Kasese.

• There is need to increase food production through irrigation to sustain the ever increasing population.

• Some crops need too much water which can be easily provided through irrigation e.g. rice, sugarcane, yams e.t.c.

• Irrigation is carried out to maintain moisture in the soil in order to help in the maintenance of soil fertility.

- Some areas receive very hot temperatures and they lose a lot of water through evaporation in the dry season hence the need for irrigation e.g. Kasese and Mobuku valleys.
- The government policy of opening up remote areas and improvement of agricultural productivity has also led to irrigation.
- Existence of extensive free land due to sparse population in dry areas has also led to use of irrigation.
- Presence of rivers that provide permanent sources of water for irrigation e.g. river Malaba for Doho irrigation scheme.
- Availability of adequate capital to buy the machines e.g. water pumps and to extend social infrastructures e.g. railway lines e.t.c.
- Existence of gently sloping land which favours irrigation by gravity flow of water e.g. at Mwea-Tebere.
- Existence of modern technology which ensures use of irrigation e.g. overhead sprinkling at Kilombero.

KILOMBERO VALLEY IRRIGATION SCHEME

➤The scheme started in 1960 and it became a government parastatal called Sugar Development co-operation in 1968.

➤Today, it employs over 46,000 workers and it contributes 40% of the total sugar production in Tanzania.

➤It has mainly encouraged the development of out growers' schemes.

SKETCHMAP OF KILOMBERO VALLEY IRRIGATION SCHEME SHOWING RIVERS, TOWNS, IRRIGATED AREAS AND RAILWAY.
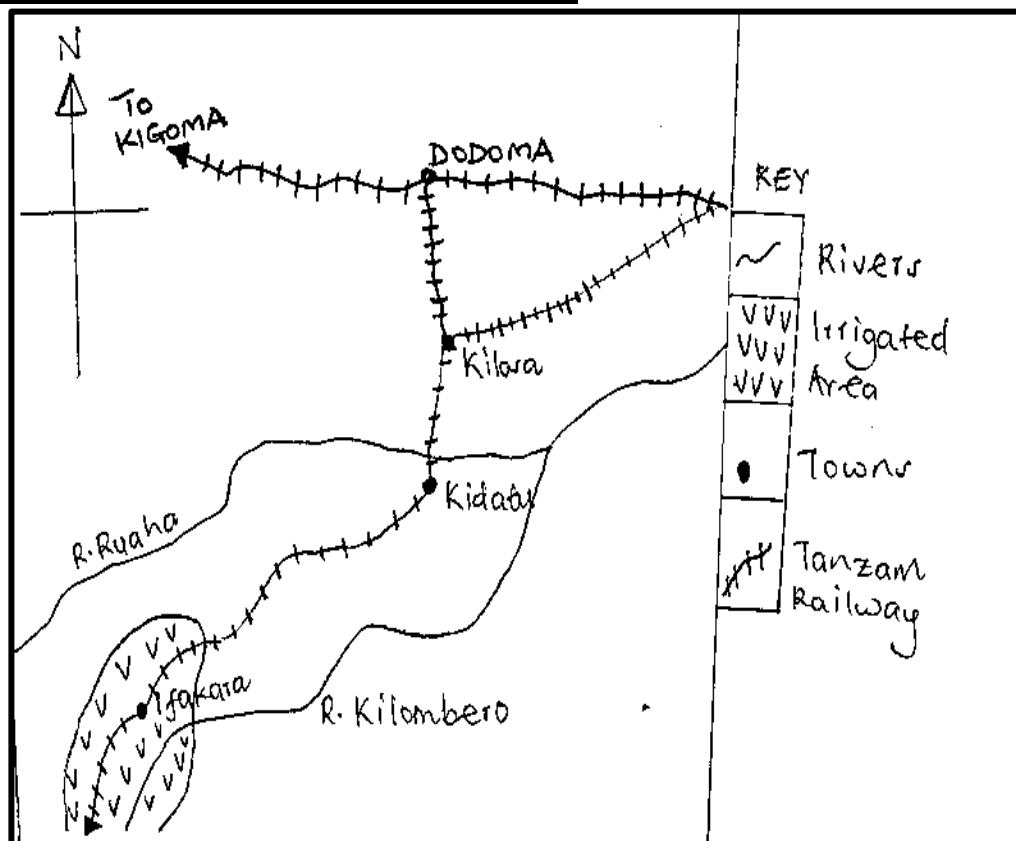
Aims of Kilombero valley irrigation scheme

❖ To control flooding of river Kilombero and Ruaha in the area.

❖   To reclaim the fertile land for farming along River Kilombero.

❖   To open up the remote and poor areas of southern Tanzania economically.

❖   To diversify the economy of the area especially the out growers' to ensure constant flow of income.

Factors that favored location of the scheme

✓   Presence of rivers such as Kilombero and Ruaha that provide constant supply of water for irrigating sugarcane.

✓   The gently sloping land which favors use of machines for large scale farming e.g. ploughs and tractors.

✓   The flat nature of the area which favors irrigation by use of gravity flow of water.

✓   Extensive land due to sparse population also provided enough land for the large scale irrigation scheme.

✓   Availability of deep and well drained fertile alluvial soils deposited by R. Kilombero for the growing of sugarcane.

✓   Hot temperatures of about 23^0C and above which favor the growth, ripening and harvesting of sugarcane.

✓   The rainfall is unreliable hence leading to the use of irrigation to supplement the rainfall.

✓   Presence of ready market for the sugar which is both local and international e.g. Zambia.

✓   Supportive government policy to open up remote areas in southern Tanzania also led to the setting up of the scheme.

✓   Opening up of the Tanzam-Tazara railway in 1975, also increased accessibility to the area hence providing cheap transport.

✓   Availability of adequate capital from Kilombero Company for investment e.g. Buying machines, land and paying workers.

✓   Availability of abundant and cheap labour to work on the scheme e.g. from the surrounding communities.

Benefits of the scheme

▪   It has provided employment opportunities for the Tanzanian population hence improving their standards of living.

▪   It has led to the development of roads and railways e.g. the extension of Tanzam-Tazara railway which has made transport easier.

▪   It has diversified the agricultural activities within the area which helps to fight food insecurity.

▪   It has put idle land into good use hence ensuring resource utilization and reducing resource wastage.

▪   Sugar is exported and this brings in foreign exchange used for developing infrastructures e.g. roads.

▪   International relationship has been created between Tanzania and other countries e.g. Zambia leading to peaceful co-existence.

▪   It is a source of government revenue through taxation which is used for developing infrastructures e.g. hospitals.

▪   Source of sugar which is a vital commodity for the people in the area.

▪   It has helped to control the diverse effects of flooding in the area hence reducing on destruction of property.

- Infrastructure has been developed e.g. roads, schools, hospitals and markets leading to urbanization e.g. Kidatu, Ifakara and Kilosa towns.
- Has led to development of research in sugarcane varieties hence boosting people's knowledge.
- It has led to establishment of processing industries which have provided employment opportunities to the people in the area.
- The scheme has helped resettle people who were formerly landless and jobless hence reducing on land wrangles and crime in the area.

Problems facing the farmers on the irrigation scheme
- Diseases e.g. yellow wilt that destroys the sugarcane leading to reduced output.
- Soil exhaustion due to monoculture leading to low output hence low export potential.
- Leaching of soil due to the excessive water which leads to poor soils hence low productivity.
- Pests e.g. snails which destroy the sugarcane hence leading to poor quality output.
- Price fluctuation due to over production and competition with other sugar producing countries e.g. Uganda leading to low morale of farmers.
- Shortage of labor especially during the harvesting period due to low population in the area.
- Fire out breaks which destroy large parts of the farms leading to losses for the scheme.
- Dangerous animals like snakes which scare away the farmers leading to labor shortage.
- Presence of weeds which compete with sugarcane for water and soil nutrients leading to poor quality output.
- Silting of the canals by floods which calls for regular dredging yet it's very expensive.
- It requires high capital investment to operate the scheme yet capital is not readily available.
- Salinity of the soils due to excessive evaporation as a result of hot temperatures in the area.
- Inefficient transport within the scheme which makes the delivery of sugar to the markets very difficult.
- Natural hazards e.g. hailstorms and strong winds also destroy large parts of the scheme leading to losses.

Steps being taken to solve the problems
➢ Spraying of crops by using pesticides to avoid pests and diseases.
➢ Price control by government and production by quota system to avoid price fluctuation at the world market.
➢ Research on better sugarcane varieties to increase production and quality.
➢ Applying fertilizers and manure to increase soil fertility and ensure high productivity.
➢ Use of herbicides to control weeds and reduce competition for soil nutrients.
➢ Controlling fire outbreaks by living bare land between plots (patching) to stop fire from spreading.
➢ Diversification of agriculture to reduce over reliance on sugarcane growing e.g. introduction of ranching.
➢ Encouraging mechanization to solve the problem of labor shortage especially during harvesting.
➢ Acquiring loans from banks to provide large capital base for farm operations.

- ➤ De-silting and dredging of canals to control floods and ensure proper flow of water.
- ➤ Construction of feeder roads and railways within the scheme to improve accessibility to markets.

MWEA-TEBERE IRRIGATION SCHEME
- • It's the largest irrigation scheme in East Africa.
- • Water is got from River Thiba, River Nyamindi and River Tana.

A sketch map showing site and extent of Mwea-Tebere
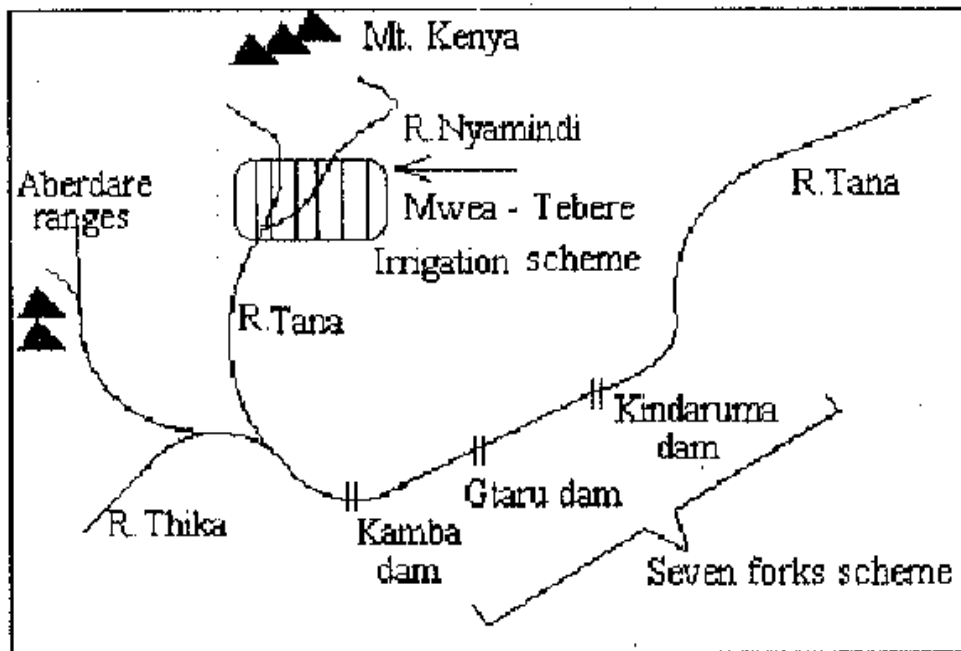
Aims of the scheme
- ➤ To provide employment to the political detainees.
- ➤ To resettle the land less people.
- ➤ To produce rice and other food crops on large scale.
- ➤ To develop the area of North East Kenya.

Conditions which have favored the location of Mwea-Tebere project
❖ Availability of permanent water sources e.g. River Nyamindi, Thiba and Tana to provide water for irrigation.
❖ The gently sloping landscape i.e. the piedmont plain on the lower slopes of mountain Kenya allowing irrigation by gravity flow.
❖ The presence of fertile black volcanic soils for cotton and red clay soils which support rice growing.
❖ Availability of extensive tracts of land which was sparsely populated hence providing free land for the project.
❖ The area receives low and unreliable rainfall of 750mm per annum which favors irrigation.
❖ Supportive government policy of setting up irrigation schemes to develop remote areas of Mwea-Tebere.
❖ Availability of adequate capital for investment e.g. to purchase farm inputs and tools to be used for farming.

❖ Availability of ready market both local and international for the farm produce.
❖ Availability of well-developed transport lines e.g. Nairobi-Nyeri railway line for delivering rice to markets.
❖ Presence of landless people who were ready to be recruited and provide cheap labour to work on the scheme.

Benefits of Mwea–Tebere irrigation scheme
✓ Source of food especially rice for human consumption.
✓ Provided employment opportunities to the farmers hence improving their standards of living.
✓ The project has helped to re-settle people who were formally landless.
✓ The project has led to improvement in the infrastructure e.g. roads which has improved transport in the area.
✓ Flooding of the rivers has been controlled hence improving the safety of lives of the people around.
✓ It's a source of government revenue through taxes used to develop infrastructures e.g. roads.
✓ It has led to improvement in research hence resulting into high crop yielding varieties.
✓ The project led to effective utilization of the land which could have remained idle hence reducing resource wastage.
✓ It has led to development of processing industries which have led to urbanization e.g. the rice mill at Mwea-Tebere.
✓ Infrastructural development has led to urbanization e.g. Thiba and Embu towns.
✓ It has led to large scale output hence encouraging exports leading to acquisition of foreign exchange by government.

Problems faced by farmers on the scheme
❖ Pests which destroy stored crops leading to losses e.g. rice weevils.
❖ Diseases also destroy crops leading to low output e.g. rice blast and rice rust.
❖ Price fluctuations due to over production which discourage the farmers from further production.
❖ Weather changes which affect the output e.g. cool temperatures and heavy storms which destroy the crops.
❖ Reduction in soil fertility due to monoculture leading to low output.
❖ Weeds which compete with crops for soil nutrients leading to low quality output.
❖ Limited capital for further investment which also leads to reduced output.
❖ Soil salination due to high evaporation rates in the area leading to low output.
❖ Inadequate labor force especially during the harvesting period which brings activities to a standstill.
❖ Silting of canals which cause floods leading to destruction of farmlands.

Steps being taken to solve the problems
➢ Spraying of crops by using pesticides to avoid pests and diseases.
➢ Price control by government and production by quota system to avoid price fluctuation at the world market.
➢ Research on better rice varieties to increase production and quality.
➢ Applying fertilizers and manure to increase soil fertility and ensure high productivity.
➢ Use of herbicides to control weeds and reduce competition for soil nutrients.
➢ Weather studies are emphasized to reduce effects of weather destruction.

➢ Diversification of agriculture to reduce over reliance on rice growing e.g. introduction of cotton and peas.

➢ Encouraging mechanization to solve the problem of labor shortage especially during harvesting.

➢ Acquiring loans from banks to provide large capital base for farm operations.

➢ De-silting and dredging of canals to control floods and ensure proper flow of water.

TYPES OF CROPS GROWN IN EAST AFRICA

a) Perennial crops: These are crops that take more than 1 year from the time of planting to the time of the first harvest e.g. coffee, tea, tobacco, sugarcane. Most of these crops require heavy rainfall throughout the year.

b) Annual crops: These are crops which are grown and harvested in one season or harvested within a year e.g. beans, peas, cereals. Such crops require alternate wet and dry seasons.

1. **Sugarcane:** Sugarcanes are widely grown around Lake Victoria shores at Lugazi, Kakira in Jinja, Mumias in Nyanza province, Bukoba and along river Kagera, in Rakai (Sango bay), at Kinyara (Masindi) and Kilombero valley irrigation scheme.

Conditions for the growth
- High levels of humidity which ensures heavy rainfall for proper growth.
- Average temperatures of about 20^0C and above especially during the harvesting season.
- Low altitude between 0-150m below sea levels to ensure warm temperatures for proper growth.
- Heavy rainfall of about 1500mm spread over 9months or with use of irrigation especially during the planting period.
- Deep and well drained fertile alluvial soils for the growing of the sugarcanes.
- Abundant and cheap labor force especially during the planting, weeding and harvesting periods.
- Gently sloping landscape for easy drainage of water in the soil.

2. **Pyrethrum:** This is a white flowering plant which contains a chemical substance used in insecticides. Mainly grown in high altitude areas e.g. in Kenya along the slopes of Mt. Kenya, Aberdare ranges, Kikuyu land, and slopes of Mt. Kilimanjaro, Arusha, Mt. Meru, Mbeya and Usambara ranges and Southern highlands in Tanzania.

Conditions for its growth
- Fairly cool and moist conditions for plant growth.
- High altitude of about 1000m to 1800m above sea level to ensure cool conditions.
- Well drained and fertile loam soils for proper plant growth and high yields.
- Heavy and reliable rainfall of about 1500mm per annum for high yields of the crop.
- Cheap and abundant labor especially during the harvesting period.
- Well-developed transport routes linking to industries since it's grown in highland areas.
- Extensive land for large scale growing to ensure high output.
- High humidity all year round for luxuriant growth of the crop.
- Abundant sunshine for ripening and harvesting of the crop.
- Supportive government policy to encourage plantation agriculture.
- Gently sloping landscape for easy movement of the workers.
- Ready market for the crop which is both local and international e.g. in China.

3. **Coffee:** This is the chief exchange earner crop of Uganda but Kenya is the biggest producer in East Africa. There are two types of coffee;

➢ **Arabica coffee** mainly grown on the slopes of mountain Elgon, Rukungiri, Kabarole, Kabale, Aberdare ranges, Mt. Kenya, Kilimanjaro slopes, Mt. Usambara and Mt. Meru near Arusha and Moshi.

➢ **Robusta coffee** mainly grown along Lake Victoria basin covering districts like Mukono, Mityana, Masaka and Rakai in Uganda. Its also grown in Bushenyi, Nebbi, Kapchorwa, Masindi, Hoima, Busia and Fort Portal. In Tanzania, it's grown around Bukoba and in the southern highlands.

Conditions for the growth of coffee
✓ Fertile and well drained soils i.e. alluvial for Robusta and Volcanic for Arabica for growing the crop.
✓ High altitude of about 1500 – 2300m for Arabica and low altitude of about 1000-1500m for robusta.
✓ Generally average/moderate temps not exceeding 25^0C for proper maturity of coffee.
✓ Heavy rainfall between 1000mm – 1500mm of rainfall needed during the planting season.
✓ Protection from strong winds by practicing agro-forestry.
✓ Alternate spraying to control pests and diseases e.g. the coffee berry.
✓ Cheap and abundant labor needed especially during the harvesting season.
✓ Adequate capital needed for buying fertilizers, pesticides and farm implements.
✓ Very hot temperatures of about 27^0C for drying of the coffee.
✓ High humidity which ensures heavy rainfall total for proper growth.
✓ Presence of extensive and gently sloping land for the growing of the crop.
✓ Availability of ready market both local and international.

Uses of coffee
➢ Used as a beverage for drinking after processing.
➢ Coffee husks are a good source of manure used to improve soil fertility.
➢ Coffee husks and wood are used as fuel for cooking in rural areas.
➢ Coffee husks are also used as litter in poultry shelters.
➢ Coffee stems are used as building materials e.g. in mud houses.
➢ Used as a herbal medicine especially in Buganda and Bunyoro.
➢ Coffee is also used in the manufacture of gun powder for making bullets.

PROBLEMS FACING COFFEE PRODUCTION IN EAST AFRICA
• Pests which destroy large parts of farms leading to losses e.g. termites.
• Diseases which lead to poor quality output such as coffee wilt disease and coffee berry disease.
• Limited land for coffee plantations due to ever increasing population.
• Soil exhaustion due to monoculture leading to low and poor quality yields.
• Competition with other coffee producing countries like Brazil and Ivory Coast leading to inadequate market.
• Low prices and unstable coffee prices leading to price fluctuation on the world market which demoralizes the farmers.
• Prolonged drought and hailstorms which destroy coffee flowers leading to low output.
• Competition with other beverages e.g. tea, cocoa and vanilla which reduces demand.
• Dangerous animals e.g. snakes, wasps and bees which attack the workers hence scaring them away.

- Inadequate storage facilities which leads to losses due to rotting of the coffee and destruction by pests.
- Coffee has a long gestation period of about $3\frac{1}{2}$ years until the first harvest which also demoralizes the farmers.
- Shortage of extension workers to train people on how to attend to coffee properly.
- Post harvest losses also demoralize the farmers e.g. theft which leads to losses for the farmers.
- Poor means of transport leading to market centers leading to delays in delivery.

4.   **TEA:**
It's obtained by plucking, drying and curing the young leaves of the shrub tree. In Kenya, it's grown around Kericho and Limuru. In Tanzania, it's grown around Iringa and Mbeya, Southern highlands and on slopes of Mt. Kilimanjaro. In Uganda, it's grown around Lake Victoria regions in Lugazi at Kasaku Tea estates, Mityana, Bushenyi, Fort Portal and Kigezi. Harvesting takes about 3-4years after planting.

Conditions for tea growth
- Warm but not exceedingly hot climate for proper maturity of the crop.
- Fairly heavy rainfall of about 1500m which is well distributed over the growing period.
- Deep, acidic and well drained fertile alluvial Soil for the growing of the crop.
- Protection from strong winds by practicing agro-forestry.
- Alternate spraying to control pests and diseases e.g. leaf rust.
- Cheap and abundant labor needed especially during the harvesting season.
- Adequate capital needed for buying fertilizers, pesticides and farm implements.
- Careful pruning and regular hoeing to kill weeds*.*
- Availability of ready market both local and international to buy the crop.

Problems facing Tea production
➢   Competition with unwanted weeds for plant nutrients leading to poor quality produces e.g. couch grass.
➢   Pests e.g. yellow tea termites and aphids which destroy the crop leaves leading to losses.
➢   Diseases e.g. root fungus disease which leads to poor quality output.
➢   Inadequate capital yet expensive machinery is used in tea processing.
➢   Scarcity of labor to do plucking during the harvesting period.
➢   Competition with other beverages such as Coffee, Vanilla and Cocoa which reduces market for tea.
➢   Limited land for tea plantations due to ever increasing population.
➢   Soil exhaustion due to monoculture leading to low and poor quality yields.
➢   Competition with other tea producing countries like Brazil and Malaysia leading to inadequate market.
➢   Unstable tea prices leading to price fluctuation on the world market which demoralizes the farmers.
➢   Natural hazards e.g. hailstorms which destroy large parts of plantations leading to low output e.g. at Kericho.
➢   Dangerous animals e.g. snakes, which attack the workers hence scaring them away.
➢   Inadequate storage facilities which leads to losses due to rotting of the tea and destruction by pests.
➢   Tea has a long gestation period of about 3 to 4years until the first harvest which also

demoralizes the farmers.

5. Sisal:

The crop can be grown in most parts of East Africa including those with low and unreliable rainfall and poor sandy soils. Tanzania is the major producer and it's grown mainly along the coast near Tanga, Lindi and Dar-es-salaam. In Kenya, its grown along the coast in near Mombasa, Masai land and near Nakuru. Used for making sacks and ropes.

Conditions for sisal growing

❖ Needs constantly hottemperatures above 20°C to grow well.

❖ Grows well at an altitude of about 900-1500m above sea level.

❖ Requires an annual rainfall of about 650mm needed during the planting season and can also tolerate drought.

❖ A long dry season for harvesting the crop.

❖ Requires moderately fertile sandy-loamy soils for growing the crop.

❖ A large labor force needed especially during the planting and harvesting season.

❖ Extensive and flat landscape because the crop can't be grown alongside other crops and needs a lot of spacing.

❖ Availability of ready market both local and international to but the crop.

Problems faced in sisal production

• It's affected by diseases such as Honey dew and leaf blight which lead to poor quality output.

• Weather changes e.g. heavy rains lead to rotting of the stems hence losses for farmers.

• The crop is thorny which makes it difficult to harvest.

• Requires a lot of capital investment to buy farm equipment e.g. gum boots and gloves.

• Competition from synthetic fibres e.g. nylon and polythenes which reduces market for sisal products.

• Soil exhaustion due to monoculture leading to low and poor quality yields.

• Scarcity of labor especially during the harvesting period.

6. **Tobacco:** It's a commercial non-food plant which is consumed by smoking and by chewing. It's used in the manufacturing of cigarettes. It's widely grown in the west Nile region of Uganda e.g. Arua, Adjumani, Nebbi, Yumbe and Moyo. Other areas where its grown in Uganda include; Kiryandongo, Nakasongola, Kigezi, Bushenyi, Wakiso, Mubende, Masindi, Oyam and in Soroti. In Tanzania, it's grown around Urambo area within the Miombo woodlands, Tabora, Songea and Iringa. In Kenya, it's grown in Kikuyu land e.g. Nyeri and Nyahururu and also near Eldoret, Kitale, Nakuru and Limuru.

Conditions for growth

✓ Warm temperatures of between 13-27°C for proper maturity of the crop.

✓ An average altitude of between 900-1500m above sea level for proper growth.

✓ Light and well-drained fertile sandy-loamy soils for the growing of the crop.

✓ Moderate rainfall of about 380-500mm needed in the first $3\frac{1}{2}$ months for the growing of the crop.

✓ Warm and moist conditions during the ripening and harvesting period.

✓ Gently sloping and extensive land for growing the crop.

✓ Abundant and cheap labor force needed for planting, weeding, spraying and

harvesting of the crop.
- ✓ Protection from strong winds by practicing agro-forestry.
- ✓ Alternate spraying to control pests and diseases e.g. aphids and leaf rust.
- ✓ Adequate capital needed for buying fertilizers, pesticides and farm implements.
- ✓ Presence of ready market which is both local and international to buy the crop.

Problems facing Tea production
- ➢ Competition with unwanted weeds for plant nutrients leading to poor quality produce.
- ➢ Pests e.g. aphids which destroy the crop leaves leading to losses.
- ➢ Diseases e.g. root fungus disease which leads to poor quality output.
- ➢ Inadequate capital yet expensive machinery is used in tobacco processing.
- ➢ Scarcity of labor to do the plucking during the harvesting period.
- ➢ Competition with other countries producing cigarettes e.g. Marlboro and Rex from USA.
- ➢ Limited land for tobacco plantations due to ever increasing population.
- ➢ Soil exhaustion due to monoculture leading to low and poor quality yields.
- ➢ Unstable prices leading to price fluctuation on the world market which demoralizes the farmers.
- ➢ Natural hazards e.g. hailstorms which destroy large parts of plantations leading to low output.
- ➢ Dangerous animals e.g. snakes, which attack the workers hence scaring them away.
- ➢ Inadequate storage facilities which leads to losses due to rotting and destruction by pests.

7.   **Rice:**
In Uganda, it's grown in Pallisa, Namutumba, Bugiri, Manafwa and Iganga in eastern Uganda. Upland rice does not require a lot of water and so it's grown in Wakiso, Kayunga and Mukono districts. It's also grown at Kibimba rice scheme, Doho rice scheme, and Olwenyi rice scheme near Lake Kyoga. In Kenya, it's grown in the Nyanza Province e.g. Bungoma and near Mumias in western Kenya. Rice growing is also supervised on irrigation schemes e.g. Mwea-Tebere, Ahero and also grown by peasants on banks of River Tana. In Tanzania, rice is grown at Kilombero irrigation scheme, southern shores of Lake Victoria e.g. at Bukoba, southern shores of Lake Malawi, along river banks e.g. river Rufigi, river Pangani and river Wami.

Conditions for growth
- ❖ Heavy rainfall of about 1500mm per annum needed during the planting season for proper growth.
- ❖ Flooded conditions with a soil depth of over 25m and the water shouldnot be always stagnant.
- ❖ Hot temperatures of over 20°C especially during the planting and harvesting season.
- ❖ Heavy clay-loamy soils with a high moisture and water retention capacity.
- ❖ Fertilizers particularly nitrogen, phosphorous and potassium to ensure soil fertility due to monoculture.
- ❖ Level ground surface to easily allow flooding during the growing period. It grows so well in deltas.

- ❖ Requires a lot of cheap labor to cultivate and harvest the crop.
- ❖ High capital investment to buy fertilizers, land and farm equipment e.g. combined harvesters.
- ❖ Proper storage facilities should be availed to reduce destruction by pests e.g. rice weevils.
- ❖ Extensive landscape because the crop can't be grown alongside other crops.
- ❖ Well-developed transport routes linking to stores and industries because the crop is grown in swampy areas.

Problems experienced by ricefarmers

- ➢ Pests e.g. rice weevils destroy the stored rice leading to losses for the farmers.
- ➢ Diseases e.g. rice blast attack the crop leading to poor quality output.
- ➢ Loss of soil fertility due to practice of monoculture.
- ➢ Threat of snakes that attack and kill the farmers.
- ➢ Weather failure such as drought which leads to stunted growth of the crop.
- ➢ Gazzetting of wetlands for ecological reasons e.g. tourism has reduced land for rice growing.
- ➢ Water borne diseases e.g. bilharzias and cholera attack the farmers hence reducing labour force.
- ➢ Competition from other rice producing countries e.g. Pakistan and Vietnam which reduces market for local rice.
- ➢ Poor transport facilities leading to markets, stores and industries hence delaying deliveries for processing.
- ➢ Inadequate capital for buying farm implements and fertilizers.
- ➢ Poor storage and packaging facilities which leads to attacks from pests e.g. rice weevils.
- ➢ Birds are a common threat because they destroy rice fields leading to losses.

8. **COTTON:**

In Uganda. It's grown in Gulu, Lira, Soroti, Tororo, Oyam, Dokolo, Amolatar, Kaberamaido, Iganga, Kasese, Apac and Kamuli. In Kenya, it's grown in the Nyanza province near Kisumu and Bungoma. In Tanzania, it's grown near Tabora, Kondoa region and in Sukuma land.

CONDITIONS FOR GROWING OF COTTON

- ▪ Alternating wet and dry season for growing and harvesting respectively.
- ▪ Relatively flat or undulating landscape for mechanized farming.
- ▪ Warm or Hot temperatures above 20°C for ripening and harvesting of the crop.
- ▪ Fairly deep and fertile black loamy soils for the growing of the crop.
- ▪ Moderate to light rainfall of about 510mm needed during the planting season.
- ▪ Large supplies of labor for planting and picking/harvesting of the cotton.
- ▪ Large amounts fertilizers to enrich the soil with favorable nutrients.
- ▪ Proper storage facilities in form of ginneries to reduce losses due to cotton stainers.
- ▪ Adequate capital used for buying farm implements e.g. hoes and fertilizers.
- ▪ Well sheltered from strong winds by practicing agro-forestry.

Problems facing cotton farming

- • Pest e.g. cotton boll weevils and cotton stainers which destroy large parts of farms leading to losses.
- • Cotton diseases e.g. leaf rust also lead to poor quality output.
- • Political instability especially in northern Uganda that disrupted cotton cultivation for a

very long time.

- Climatic hazards like flooding due to heavy rains or hailstorms that destroy large parts of farm lands.
- Collapse of cotton ginneries and factories which reduces market for cotton.
- Inadequate storage facilities hence loss of cotton.
- Poor transport facilities linking to market centers.
- Competition with synthetic fibres like silk and polyester which reduces cotton demand.
- Inadequate labor force especially during the harvesting period.

Steps taken to solve the above problems
- ✓ Establishment of cotton ginneries to create market for cotton.
- ✓ Development of transport routes linking to market centers.
- ✓ Application of fertilizers to increase land productivity.
- ✓ Improved political stability to ensure that farmers are settled down to cultivate cotton.
- ✓ Application of irrigation farming to control weather failures e.g. prolonged drought during the planting season.
- ✓ Research to develop improved cotton varieties which give off high yields.
- ✓ Spraying to control pests and diseases.

Uses of cotton
- ❖ Used to make animal feeds e.g. cattle cake.
- ❖ Cotton seeds are used for extraction of oil for cooking.
- ❖ Used for manufacture of textiles and garments.
- ❖ Cotton wool is used for dressing wounds in hospitals.
- ❖ Cotton seeds are crushed and used to make soap.

9.   Oil palm:
This is grown extensively in Lake Victoria islands such as Kalangala and Bugala islands by the BIDCO oil company. From oil palm, edible oil is extracted and used for cooking purposes.

Conditions for oil palm growth
- ➤ Heavy and well distributed rainfall of about 2030mm per annum for proper growth.
- ➤ Constantly hot temperatures of over 20°C and plenty of sunlight for proper maturity.
- ➤ Deep and well drained alluvial soils for growing the crop.
- ➤ Cheap and abundant skilled and semi-skilled labor for growing and harvesting the crop.
- ➤ Develop quick transport network linking to processing factories.
- ➤ Relatively low altitude with warm conditions for proper growth.
- ➤ Large sums of capital for buying farm implements and fertilizers.
- ➤ Constant application of fertilizers to maintain soil fertility.
- ➤ Gently sloping landscape which favors use of machines.
- ➤ Presence of ready market which is both local and international.

Problems faced in oil palm production
- ➤ Diseases e.g. freckle and blast which lead to poor quality output.
- ➤ Climatic hazards like prolonged drought which leads to delayed growth of the crop.
- ➤ Inadequate storage facilities hence destruction of the seeds.
- ➤ Poor transport facilities linking to market centers.

➢ Competition with other sources of oil e.g. simsim, cotton and sun flower which reduces market for palm oil.
➢ Inadequate labor force especially during the harvesting period.
➢ Low level of technology e.g. climbing trees with pangas to harvest the crop.
➢ Soil exhaustion due to monoculture leading to low output.
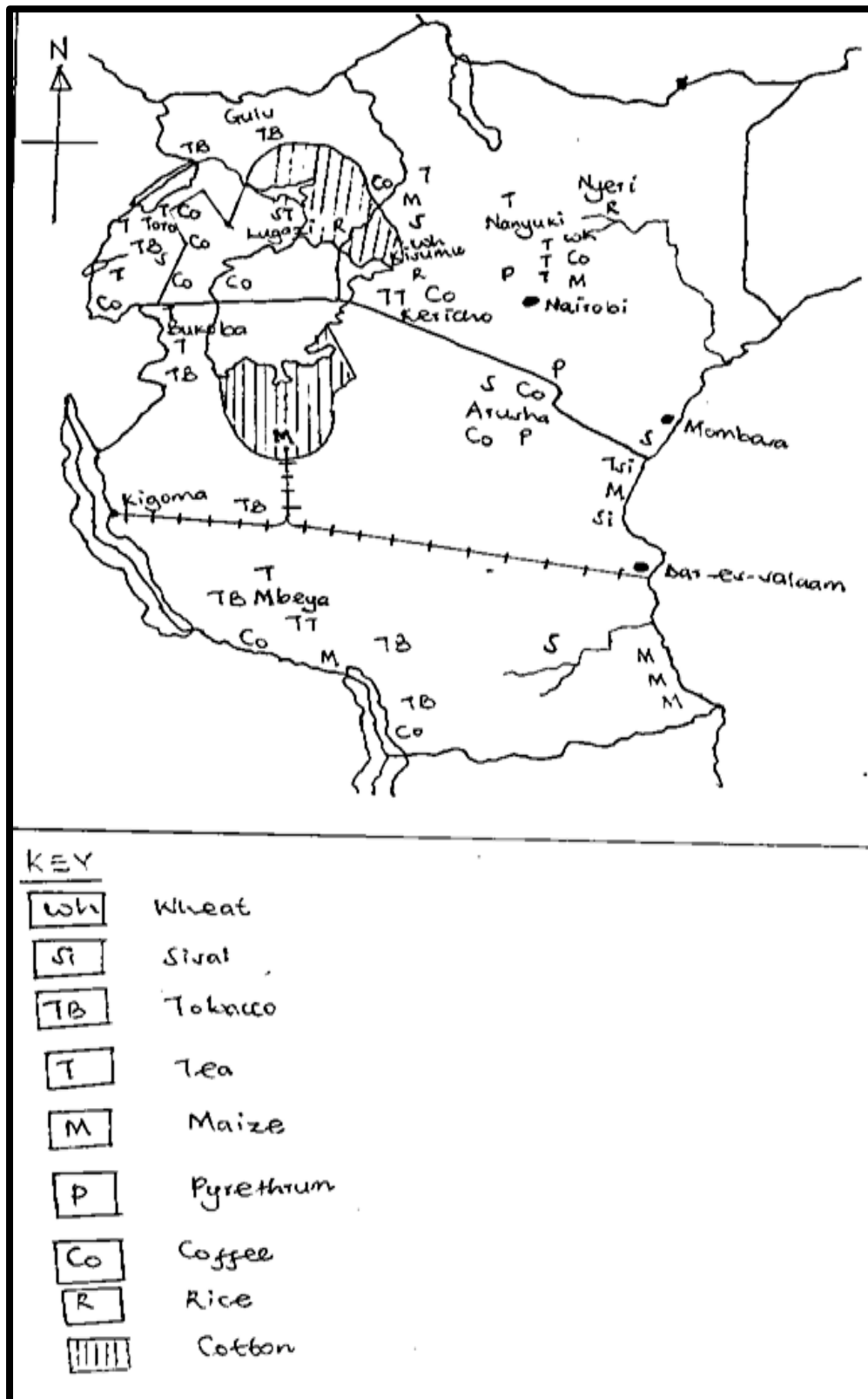➢ Fluctuation of world prices which demoralizes farmers hence loss of interest.

Effects of growing the above crops on environment
❖ They have led to deforestation when vegetation is cleared to create farmland which results into desertification.
❖ There has been displacement of people to establish big plantations leading to land disputes.
❖ Deforestation has hindered development of tourism by destroying habitats of wildlife which reduces government revenue.
❖ Deforestation has also affected the water cycle by reducing the rainfall amounts.
❖ Plantations have led to easy multiplication of pests which lead to poor quality output.
❖ Soil has been compacted together especially where machines have been used making it hard to plough such land.
❖ Monoculture has led to soil exhaustion hence leading to soil erosion and loss of soil fertility.
❖ Pesticides and insecticides have led to air pollution and some are washed down to water sources e.g. rivers hence destroying aquatic life like fish.
❖ There has been loss of bio-diversity by destroying habitats for bees, monkeys, birds and snakes.
❖ Plantations have attracted large population which has resulted into land fragmentation, high crime rates and pollution.
❖ There has been swamp reclamation as a result of establishing farms e.g. rice and sugarcane farms.
❖ Organic materials for soil formation e.g. leaves are destroyed by clearing vegetation.
❖ There has been destruction of the scenic beauty of the landscape by clearing vegetation.
❖ Wind speed increases when trees are cut leading to wind erosion and destruction of farms by strong winds.

Importance of growing the above crops to economic development
▪ Have led to industrial development hence diversifying the economy.
▪ They have provided employment opportunities hence improving peoples' standards of living.
▪ Government earns revenue through taxes used for developing infrastructures like roads.
▪ Government also earns foreign exchange through exportation of the by-products e.g. cotton lint.
▪ Roads have been developed which has improved on transport in the areas.
▪ These crops have put idle land to good use e.g. swamps and hills.
▪ Plantations are used for research and study purposes by students on field work.

MAP SHOWING CROPS

KEY

Symbol	Crop
Wh	Wheat
Si	Sisal
TB	Tobacco
T	Tea
M	Maize
P	Pyrethrun
Co	Coffee
R	Rice
(hatched)	Cotton

MARKET GARDENING

❖ This is the production of vegetables, fruits and flowers for sale in nearby towns and cities.

❖ It's mainly carried out near towns due to readily available market in towns.

❖ Crops grown include: tomatoes, Onions, carrots, apples, pineapples, cabbages, oranges, beans etc...

❖ In East Africa, it is highly developed in Kenya and particularly in Nairobi.

❖ Most of the market garden centers supplying Nairobi are found in Limuru, Kiambu and Kinango plateau.

❖ Other areas where market gardens are found are Machakos, Baringodistrict, Kakamega, Eldoret, Kitale, Mombasa and around Kisumu.

❖ It's also important around Arusha, Moshi, Bukoba, Dodoma and Dar-es-salaam in Tanzania.

❖ In Uganda, it's common around Kampala in places like Mukono, Entebbe, Wakiso, Kayunga, Mpigi and also in Jinja.

Factors favouring market gardening

✓ Moderately cool climate for the growing of vegetables, flowers and fruits.

✓ Fertile and well drained soils for the growing of the crops.

✓ Large and ready market for the produce provided by the people in the city.

✓ Availability of adequate capital to invest in buying farm equipment.

✓ Presence of well-developed transport network like airports and roads for delivering goods since they are perishables.

✓ Advancement in science and bio-chemical technology for better yields e.g. application of fertilizers.

✓ Presence of abundant skilled labor force to works on the farms.

Importance of market gardening

• Source of food to the non-agricultural urban and industrial population.

• Source of foreign exchange through crop exports to Germany, United Kingdom and France e.t.c.

• Provides employment to many people hence improving their standards of living.

• Provides flowers required for house decorations and functions e.g. Nsimbe Estates in Mpigi and Rose Bud at Entebbe.

• Source of raw materials for industries producing food stuffs, cosmetics and perfumes from aromatic herbs.

• Leads to development of infrastructures e.g. schools and roads that have led to urbanization.

• Helps in economic diversification which ensures constant capital flow for government.

• Government earns revenue through taxes which is used for developing infrastructures like roads and hospitals.

• Leads to development of research facilities which boosts agricultural sector e.g. at Kawanda Research Station.

• Leads to development of transport routes e.g. feeder roads leading to easy movement of goods and services.

N.B. East Africa's exports are mainly dominated by agricultural commodities e.g. coffee, tea, tobacco, sugar cane, oil palm, cotton, pyrethrum, flowers and fruits.

Dangers of over depending on the exportation of agricultural products

➢ Agricultural products are prone to climatic hazards e.g. hailstorms and long drought cause fluctuation of products for export.

➢ Pests attack the crops leading to reduction in quantity for export which reduces foreign exchange earnings.

➢ Disease outbreaks also attack the crops leading to poor quality output which reduces market demand.

➢ They are perishable and therefore require air transport which is expensive to transport to foreign markets for export.

➢ Agricultural products are bulky and therefore difficult to handle for export.

➢ Price fluctuations on the world market cause unstable export earnings hence reducing government earnings.

➢ Agricultural products fetch low prices on the world market which discourages farmers from growing crops for export.

➢ Losses due to poor storage facilities which reduce on the quality and quantity for export.

➢ Agricultural products are seasonal and therefore can't be relied on for constant supply for export.

➢ Most farmers are reluctant or have inadequate capital to adopt modern agricultural methods for export production.

➢ Most agricultural areas are inaccessible which limits quick delivery for exportation.

Steps taken to solve the problems of over dependence on agricultural products for export

✓ Encouraging government to promote economic diversification to offer an alternative to the agro-based economy.

✓ Liberalization of the economy to encourage private investment in the economy to foster economic development.

✓ Diversification of the export sector and encourage exportation of other commodities e.g. timber, fish and minerals.

✓ Developing export promotion industries to export manufactured goods with high market demand.

✓ Promotion of tourism as an invisible export to bring in more foreign exchange for national development.

✓ Promotion of exportation of services e.g. banking, transport, labour, education to widen tax base for government.

✓ Educating and sensitizing the masses about the dangers of over reliance on agriculture and offer alternatives for survival.

✓ Widening the export market base by investing in market research and creation of new trade partners.

✓ Reviving co-operative societies to improve on marketing of agricultural products for export.

✓ Encouraging scientific research to improve on the quality and quantity of agricultural exports.

✓ Improving handling and packaging of perishable agricultural export crops through reviving marketing boards and co-operative

✓ Using pesticides and herbicides to control pests and diseases to improve on quality and quantity of export crops.

✓ Exporting art and craft products to offer an alternative export item.

MINING IN EAST AFRICA

Mining is the extraction of natural resources from the earth's crust for economic use.

Types of minerals

▪ **Metallic minerals:** These include iron ore, gold cobalt, copper, tin, wolfram, tungsten, zinc, manganese e.t.c.

▪ **Non-metallicminerals:** These include; petroleum, phosphates, soda ash, sand, clay, Gypsum, mica, water, coal, e.t.c

Major minerals in East Africa, mining method used and products from the minerals

MAJOR MINERALS IN EAST AFRICA.

KEY

CU	Copper	P	Phosphates
W	Wolfram	V	Vermiculite
T	Tin	MI	Mica
L	Limestone	⊗	Gold found i
D	Diamond		
Sa	Salt		

Minerals.	Country.	Area mined.	Mining methods.	Products
Diamond	Tanzania	Mwadui plug	Open cast	Jewellery and strong drilling equipment
Copper	Uganda	Kilembe	Open cast	Electric cables, coins/tokens, jewellery
	Kenya	Macalda	Adit	
Gold	Tanzania	Musoma and Geita	Open cast / Adit	Jewellery
	Kenya	Kakamega	Open cast / Adit	
	Uganda	Bushenyi and Karamoja	Saucer placer and Open cast / Adit	
Soda ash (Trona)	Kenya	Lake Magadi	Dredging	Glass, soap, salt, aluminium, detergents
Lime stone	Uganda	Hima and Tororo	Open cast	Cement and lime for building
	Kenya	Bamburi and River Athi	Open cast	
	Tanzania	Tanga and Wazo hills	Open cast	
Salt	Uganda	Lake Katwe	Open cast	Salt
	Kenya	Lake Magadi	open cast	
Phosphate	Uganda	Tororo	Open cast	Fertilizers
	Tanzania	Manjingu hills	Open cast	
Flourspar	Kenya	Kakamega&Kerio valley	Open cast	Tooth paste, sulphuric acid, frying pans
Oil	Uganda	Lake Albert	Drilling	Petroleum, diesel, kerosene/paraffin and plastics

Factors that have favoured mining in East Africa

- Presence of a variety of mineral deposits which are exploited for over 20 years e.g. limestone in Tororo and Hima in Kasese, Diamond in Mwadui plug at Shinyanga and Soda ash from Lake Magadi.

- Availability of adequate capital for investment in mining operations mainly provided by foreign investors e.g. Tullow oil.

- Presence of abundant skilled and unskilled labor force for working in the mineral processing firms.

- Presence of ready market which is both local and international e.g. Japan, China and USA.

- Availability of well-developed transport facilities linking the mineral zones to processing plants e.g. railways, roads e.t.c.

- Supportive government policy to encourage mining operations e.g. through constructing transport and communication lines.

- Availability of cheap hydro electric power and other energy sources like solar energy which is used for running machines in the sector.

- Adequate supply of food from the neighboring communities to ensure continuity of the activity.

- Most minerals in East Africa are found near the surface hence making it easy and cheap to exploit.

- Improved political stability which has attracted foreign investors to invest in mining operations.

Importance of mining

❖ Governments earn foreign exchange used for national development through exportation of minerals to other countries.

❖ Governments earn revenue by taxing the workers within the mining sector used for development of infrastructure e.g. roads.

❖ It has led to the development of urban centers e.g. Tororo, Kasese, Mombasa and Kakamega hence promoting regional balance.

❖ Creation of employment opportunities for the people which boosts their standards of living e.g. engineers.

❖ It leads to development of infrastructures e.g. schools and hospitals which lead to urbanization.

❖ Improvement of international relationship through trade which promotes world peace e.g. between Japan and Uganda.

❖ Leads to diversification of the economy which increases government revenue and ensures constant capital inflow.

❖ It leads to development of industries that process the minerals leading to economic diversification e.g. Tororo cement industry.

❖ It leads to development of agriculture through provision of market for food from neighboring communities e.g. in Kasese.

❖ Roads and railway lines are constructed which lead to easy movement of goods and services.

Environmental problems due to mining

▪ It leads to soil erosion especially in highland areas where trees are cleared leading to soil infertility.

▪ Mining also leads to landslides in highland regions which destroy human property and life.

▪ It leads to air pollution during mineral processing especially limestone e.g. at Tororo.

- Leads to deforestation especially when trees are cut to expose the minerals.
- Open cast mining leaves behind large depressions/pits which in turn become mosquito breeding grounds.
- Mining also leads to water pollution which destroys habitats for aquatic animals e.g. copper pyrites are deposited in the wetlands of Lake George and Lake Edward.
- Mining causes noise pollution because of the explosives used to break rocks e.g. stone quarrying in muyenga.
- Mining also leads to destruction of land which could have been used for agriculture e.g. by depositing rock debris after rock blasts.
- Mining also leads to swamp reclamation hence destructing the water cycle e.g. quarrying of clay and sand.
- Mining also leads to silting of river valleys which causes floods.
- It leads to destruction of natural beauty by leaving behind large pits.
- It has led to loss of property through displacement of people near mining areas.
- Mining is risky it has involved suffocation of miners underground or burying them underground.
- It has led to neglect of agriculture which leads to outbreak of famine.

METHODS OF MINING

1. **Opencast mining:**This is the cheapest method. It is employed when the minerals occur close to the surface of the earth. It involves removing off of the top soil layer lying over the mineral deposit and dumping it nearby. Opencast method is used to mine surface minerals e.g. diamond, coal, iron ore, copper and quarrying of rocks such as limestone, gravel and clay for brick making.

2. **Underground mining:**This is used when the mineral is deep underground.It involves sinking vertical shafts, into the earth's crust toreach themineral ore.
   There are four (4) major types of underground mining methodsnamely;
(a) **Drift or Adit method**: This involves digging horizontal tunnels along a hill to reach the mineral.It's the method which was used to extract copper from Kilernbe mines inUganda.
(b) **Shaft method**:This is used when the mineral occurs in very steeply inclined rocks. It involves sinking vertical shafts. From the vertical shafts, horizontal tunnels are dug towards the direction of the minerals. Explosives are usually used to blast the mineral bearing rock and then transported along the tunnel to the shaft by light railway or conveyor belts. It is then brought to the surface in a type of lift called a Cage which moves up and down the shaft.

(c) **Solution method:**This is used for minerals which can dissolve in water e.g. salt, potash or sulphur. Pipes with superheated steam or water are drilled down the mineral deposit. The mineral dissolves into the water and is then pumped out to the surface. At the surface, the water is evaporated and the mineral extracted.
(d) **Drilling method**: This is used in the exploitation of petroleum and natural gas which are found in sedimentary rocks. The deposits are reached by boring wells. The petroleum or gas is then brought to the surface either under its own pressure or by pumping. It's the method which is to be used to extract petroleum from Lake Albert basin in Uganda.
N.B.1.**Saucer placer mining method (alluvial mining)** is used for minerals that occur in alluvial deposits such as gold, and tin e.g. in Karamoja, Busia and Pokot in Kenya.
   2. Dredging: This is a much more advanced form of placer mining. This is applied to

mine soda ash (Trona) from Lake Magadi in Kenya.

N.B Other minerals of importance in East Africa include;
i.Coal for making of tar and fuel.
ii. Iron ore for the manufacture of steel products e.g. iron bars, iron sheets and wire mesh.
iii. Cobalt from Kasese is used in manufacture of jet engines and high speed cutting tools.
iv. Mica from Machakos and Embu is used in manufacture of paints.

Problems facing the mining sector in East Africa
• Inadequate capital for the mining process which is very expensive.
• Minerals are non-renewable resources and will get exhausted with time e.g. copper was exhausted at Kilembe.
• Poor transport networks making mineral zones very difficult to reach.
• Political instabilities especially in Uganda e.g. ADF rebels who destabilized Kasese affected investment in copper mining.
• Some minerals are expensive to exploit because they are buried deep underground e.g. gold in Bushenyi.
• Shortage of skilled man power to undertake the mining activities leading to hiring of expatriates who are very expensive.
• Inadequate market for East Africa's minerals because they are of poor quality.
• There is limited research and exploration to discover new mineral zones.
• Some minerals are available in very small quantities and therefore not economically viable e.g. gold in Karamoja.
• Most of the mining companies are owned by foreigners who normally take profits back to their home countries.
• When the minerals are exhausted, the towns which had developed turn into ghost cities with problems of unemployment e.g. Kilembe.
• Many of the towns e.g. Kakamega which grew up because of mining are faced with problems of congestion and crimes e.t.c.
Solution to the above problems
✓ Government should seek aid and grants from development countries to widen the capital base.
✓ Investments should be made in research and exploration to get new mineral zones.
✓ International advertisements should be done to widen market for local minerals.
✓ Government should improve transport facilities in the mining areas e.g. upgrading roads from murram to tarmac.
✓ Political instability should be encouraged to attract more foreign investors.
✓ The government should encourage on-site mineral processing to produce high quality products.
✓ New courses should be introduced at different learning institutions to produce adequate skilled labor force.
✓ Diversification of the economy to reduce dependence on mining.
✓ Government should carry out market research to get new markets for East Africa's minerals.

Copper mining at Kilembe
➢ Copper was the major mineral mined at Kilembe. It was found together with cobalt.
➢ Due to sharp decrease of world prices and decrease of copper deposits, the copper mine was closed down in 1975.

➤ Copper was mined using the Adit method and taken to Jinja by railway for smelting.

➤ From there, it was exported to many countries like Japan, Britain and France.

➤ Electricity to process the copper was obtained from the Owen Falls Dam at Jinja and Mobuku power station on R. Mobuku.

➤ Water used in the mines was chiefly obtained from River Nyamwanba and River Mobuku which originate from the Rwenzori Mountain.

Benefits of copper mining to the economy of Uganda
- It stimulated the growth and development of Kilembe and Kasese towns.
- The need to exploit copper from Kilembe led to the constructionof Uganda railway which today promotes transport and trade.
- The copper mine employed over 5000 workers which improved their standards of living.
- A lot of foreign exchange was earned through its exports leading to national development.
- Facilitated the development of Mobuku power station whichprovided electricity to the mine and parts of Kilembe andKasese town.
- Stimulated development of agriculture for example Mobuku irrigation scheme was established to supply foodstuff to miners.
- It stimulated the development of other activities in the area e.g. fishing on Lake George which diversified the economy.
- It promoted international relationships between Uganda and Japan which boosted peaceful co-existence.

N.B. Though there is no copper production at Kilembe at this moment, in 2000 the Kasese cobalt plant was opened. It's an investment owned by Uganda, France and Australia exploiting cobalt which is got from copper pyrites at Kilembe.

DIAMOND MINING IN TANZANIA (MWADUI)

Diamonds are mined at Williamson Diamond mines at Mwaduilocated 27km from Shinyanga town.

Formation of diamond: The diamonds at Mwadui are found in a Kimberlite rock which was formed in an intrusive rock of Magma which solidified in a Vent or pipe to form a volcanic plug. Later, this intrusion was exposed by erosion.

Mining of diamond: Opencast method is used because the mineral bearing rock is found just below the surface of the earth.Heavy excavators scrap off the surface of the earth hence exposing the ore bearing rocks. These rocks are then loaded on to waiting trucks and then taken to the factory where the rocks are crushed to small sizes.

Processing of diamond

- From the mining zone, the ore bearing rocks are taken by trucks to the crushing plant where the rocks are crushed to small sizes and then poured on a conveyor belt which transports it to the treatment plant.

- At the treatment plant, the ore is passed through separators. The diamond and some other heavy substances because of being dense, sink to the bottom while the remaining materials float as wastes.

- For further cleaning, the diamonds are further passed over belts covered with grease to which they stick. The wastes are removed electrically.

• The diamond is then cleaned to remove all the grease and it's then ready for use e.g. making jewellery.

Factors favoring the development of diamond mining at Mwadui
➢ The diamonds are found near the earth surface hence cheap to exploit using open cast method.
➢ Diamonds at Mwadui are found in large deposits hence economic to mine.
➢ Mwadui diamonds are of high quality and on high demand on the international market.
➢ The landscape is generally flat hence easy to extract the minerals.
➢ Easy accessibility due to the presence of transport network by the railway and roads.
➢ Availability of adequate capital for investment provided by both the Williamson mining company and government.
➢ Nearness to agricultural land which provides foodstuffs to the workers.
➢ Availability of abundant skilled manpower both local and foreign expatriates to work in the mines.
➢ Presence of a variety of energy sources e.g. hydroelectric power used in mining and processing minerals.
➢ Availability of modern technology used in the mining operations.
➢ Supportive government policy which encourages mining e.g. through investment and market research.
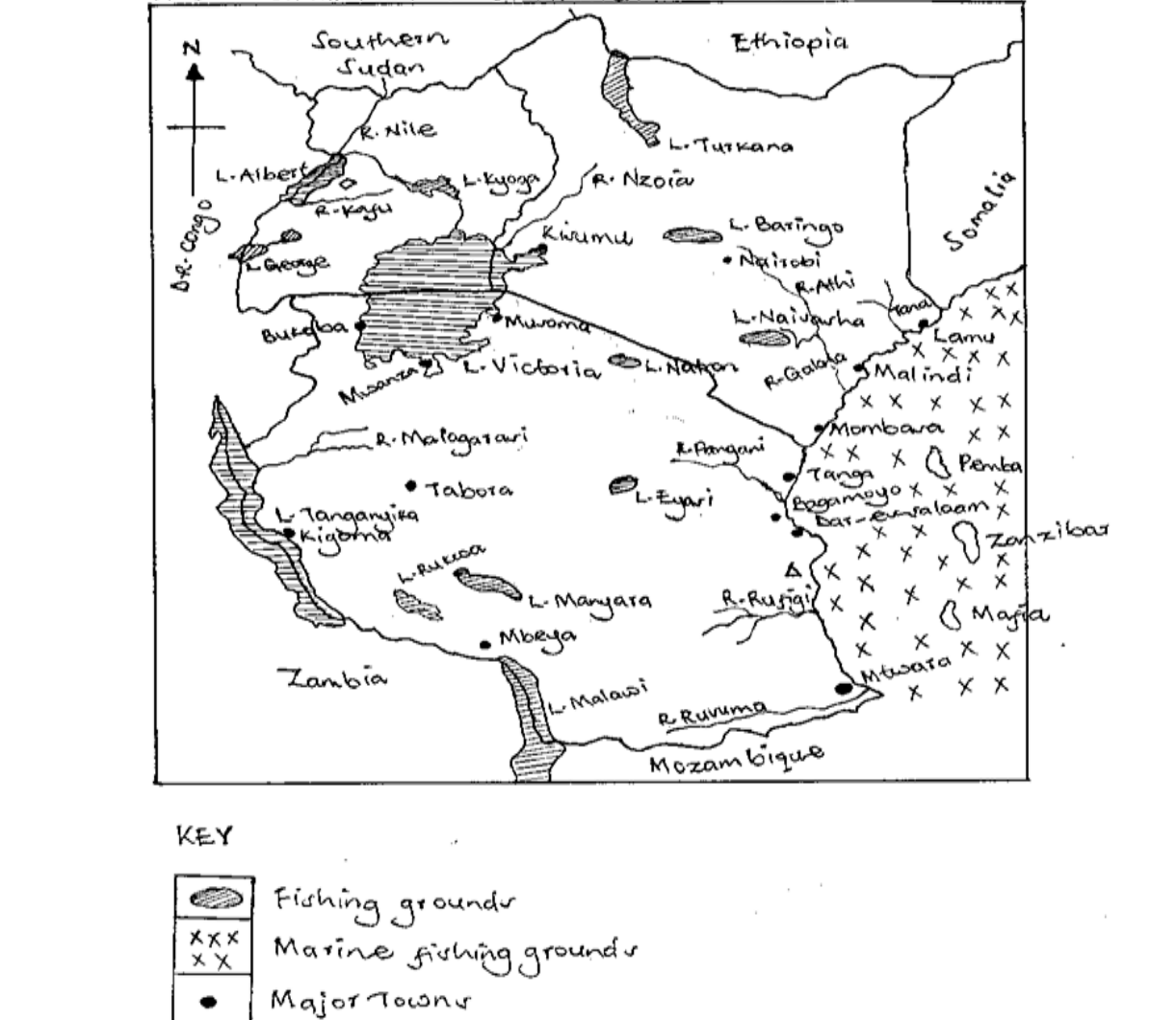
Importance of diamond mining at Mwadui
✓ The mine provides employment opportunities to many people hence improving their standards of living.
✓ It has led to the development of Mwadui town with accommodation, recreational and commercial facilities.
✓ The mining company constructed a dam which provides electricity to Shinyanga district.
✓ Facilitated development of infrastructures like roads, schools and hospitals which provide social services.
✓ The mining company trains its own labourers in mining related activities hence leading to skills acquisition.
✓ The mining company established reliable water supply to Mwaduitown and neighbouring areas.
✓ Government earns revenue through taxes used for national development e.g. building roads.
✓ Through exports, government earns foreign exchange used for national development e.g. building hospitals.
✓ Facilitated development of industries which have led to economic diversification.
✓ Agriculture has been developed in the area due to demand from the miners.

FISHING IN EAST AFRICA
➢ Fishing is the extraction of aquatic life. It involves catching fish and other aquatic life like shrimps, lobsters and crabs e.t.c.

Fishing grounds in East Africa: Fishing is carried out in fresh water and marine water bodies.

➢ Fresh water bodies include rivers, lakes, ponds and swamps.

➢ Marine fishing is done in salty water grounds like the Indian Ocean and the Mangrove swamps.

A SKETCH MAP OF EAST AFRICA SHOWING FISHING GROUNDS.

KEY

🐟	Fishing grounds
XXX / XX	Marine fishing grounds
●	Major Towns

Types/species of fish caught in East Africa

❖ There are those that are found close to the surface (pelagic fish) of the lake or ocean. These include Tilapia, Nile perch, Dagaa, Haplochromis in fresh water and Mackerel, Sardines, Anchovy in marine fisheries.

❖ There are those that are found deep in the water (demersal fish) or at the bottom (crustacean fish) e.g. shrimps, crabs and lobsters in marine fisheries.

Fishing methods used in East Africa

These are either traditional or modern methods;

(1) **Traditional Methods** are mainly used for small scale fishing mainly for home consumption and a little surplus for sale e.g. Hooks, Basket traps, Spears, use of arrows.

E.g. **used of a basket trap**: A fisherman gets into a boat/canoe that is stationed in the water. He uses a cone shaped basket which is placed in swiftly moving water e.g. along rivers or a stream. When the fish enters the basket, its trapped and then scooped out of the water into the boat.

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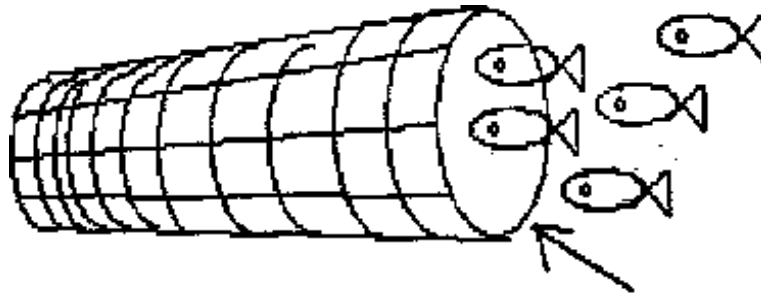
(2) Modern Methods are mainly used for large scale or commercial fishing.

❖ **Gill Netting:** This is the most used method for commercial fishing in East Africa. It involves laying a Net vertically in the water. The Net is held vertically by floats on top and weights at the bottom. The nets are left in the water for some time and when the fish try to swim through the net, they are caught by their gills and fins in the net. The Net is then pulled out of the water.
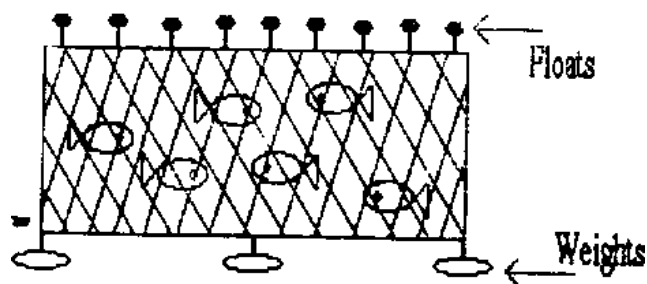

Gill netting is commonly used on Lake Victoria to catch Tilapia. It's divided into two methods which are;

(i) Beach seining: this method involves nets being operated from the shore/beach. A fisherman in a canoe/boat stretches the net into the water to encircle a shoal of fish near the shoreline. The nets have weights at the bottom and floats on top to keep them vertical in the water.

The fishermen pull the net from both sides and the fish catch is poured at the beach. Used to catch tilapia, cat fish and silver fish

(j) Drift netting: This involves use of a much bigger net which is connected to a moving boat called a drifter. The net is held vertically in water by floats on top and weights down. The fish try to swim through the net and are trapped by their gills as a motor boat slowly moves the net. Used to catch anchovy and sardines on the Indian Ocean.
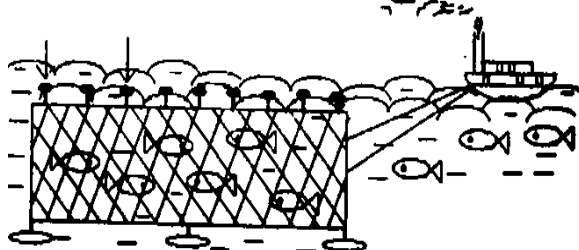

❖ **Purse seining net method:** this involve the use of two boats called seine boats. The net is laid out in a circle to surround a shoal of fish attracted by an echo sounder. At

the bottom of the net there are rings attached through which the ropes pass. Once the Net has been laid in a circular pattern the ropes are pulled so as to close the bottom of the net to make it bag-shaped to trap all the fish it has surrounded. The Net is then drawn into a boat and the fish is removed. Used to catch sardines, anchovy, mackerel, tilapia and bagrus.
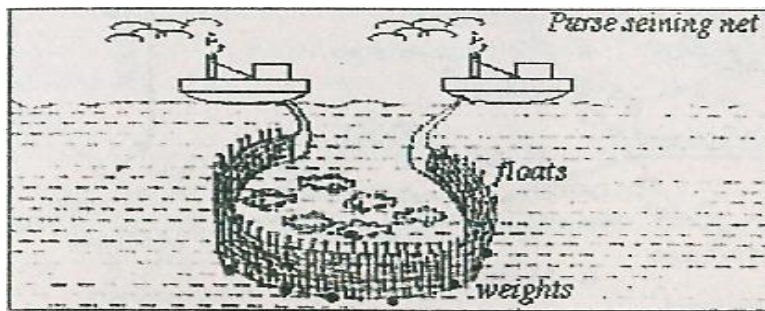
❖ **Trawler method:** this involves use of a trawl net dragged by a boat called a trawler. The net forms a wide cone shaped bag whose mouth is kept open by wooden otter boards. The Trawl is pulled along the sea bed by a boat and fish is trapped inside the bag along its way. The net is dragged in water with smooth sea beds. It's used to catch fish such as cod, sardines, mackerel and anchovy.
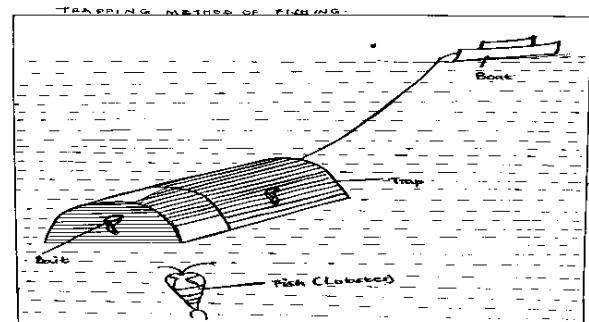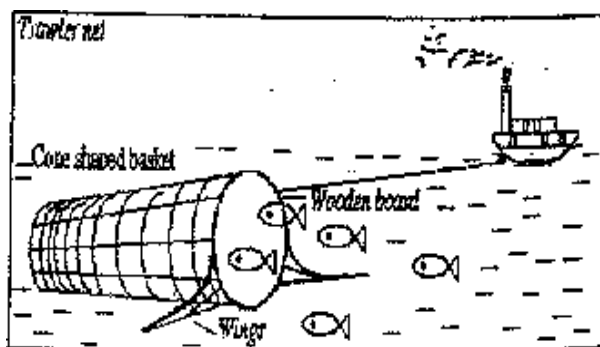
❖ **Long Lining:** In this method, a long rope which has floats and hundreds of baited hooks is set vertically in the water. The rope is pulled by a boat and it's sunk deep in rocky waters where the nets can be damaged. The fish is caught as it struggles to eat the bait on the hook. Fish species caught with this method include Nile perch (fresh water) and cod (marine fisheries).
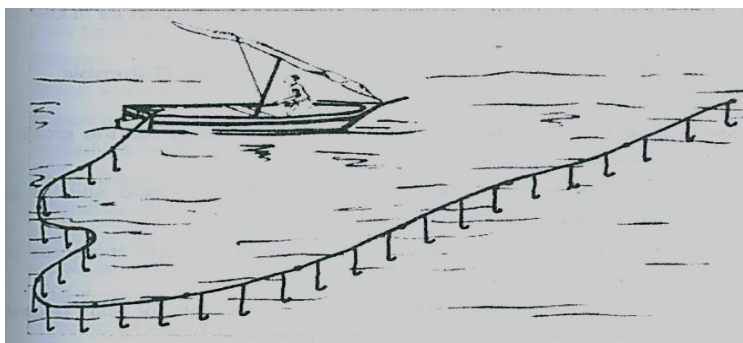
❖ **Lampara method/ lamp attraction method:** It is where bright lights (Lamps) are used to attract fish at dark nights and then trapped. The lamp is held over a floating object e.g. a rock. Fish is attracted to the light and a scoop net is used to trap a shoal of fish. This method is used to catch small fish like Dagaa from Lake Tanganyika, haplochromis from Lake Kyoga, Silver fish from Lake Victoria and sardines in the Indian Ocean.

❖ **Lobster trap:** a metallic cage is put in water. Inside the cage, there is bait which attracts the fish. The fish enters the cage to eat the bait and once it enters the cage, it can't come out. The trapped fish is then removed from the cage by divers. Cages are used in rocky water to trap sea animals that near the sea bed e.g. lobster, oysters, shrimps and crabs.

Fish preservation methods used in East Africa
Most fish caught is consumed when it is still fresh. However some preservation methods are employed that include:
➢ Simple/traditional methods for small scale like smoking, sun drying (most common), salting, frying and cooking.
➢ Modern methods for large scale companies like refrigeration (icing) and fish canning/tinning. In Uganda, such methods are applied by fish processing industries like Masese fisheries, Samaki fisheries, Ngege Uganda Ltd and Gomba fisheries. Most of the fish processing industries are developed near Lake Victoria.

Marketing of fish in East Africa
Some fish is consumed locally but some is exported to Asian and European countries e.g. Japan, China, India, Germany, Britain, France, Netherlands and Belgium.

Factors favouring development of the fishing industry in East Africa
▪ Availability of enough fishing grounds such as Lake Victoria, Kyoga, Tanganyika and Indian Ocean.
▪ Availability of high value fish species such as Tilapia and Nile perch with high market demand.
▪ Introduction of better and effective fishing methods such as the use of gill nets.
▪ Introduction of better fishing vessels such motor boats fitted with engines which are used for fishing.
▪ Presence of abundant plankton (food for fish) which has led to fish multiplication in large numbers.
▪ Improved transport network linking fishing grounds to market centers.
▪ Availability of ready market for fish which is both local and international e.g. fish processing industries, local people and neighboring D.R.C.
▪ Indented nature of fishing grounds which are favorable for development of fish landing sites e.g. Kasenyi and Majanji on Lake Victoria.
▪ Introduction of fish corporations which teach better the fishermen new and modern fishing skills.
▪ Political stability especially along Lake Victoria which has attracted foreign investors

e.g. Japanese and Indians.
▪ Availability of adequate capital for investment e.g. buying boats and engines.
▪ Supportive government policy which encourages investment in fishing activities e.g. through market research and road construction.

IMPORTANCE OF THE FISHING INDUSTRY
✓ Provision of employment opportunities to fishermen hence improving their standards of living.
✓ Source of food rich in proteins to the population.

✓ Source of foreign exchange through fish exports used for infrastructural development e.g. roads.

✓ Promotes economic diversification thereby increasing income flow and reduces dependence on agriculture.

✓ Facilitates development of fish processing industries which provide more jobs e.g. Masese and Gomba fisheries.

✓ Source of government revenue through taxation used for development of schools and hospitals.

✓ Stimulates development of other sectors like poultry throughproviding feeds e.g. silver fish (Mukene).

✓ Facilitates development of infrastructures such as roads, markets and training institutions which leads to provision of social services.

✓ Has facilitated growth of towns leading to regional balance e.g. Dar-es-salaam, Kisumu and Bukoba.

✓ Promotes tourism through game fishing e.g. at Malindi.

PROBLEMS FACING FISHING IN EAST AFRICA

➢ Limited capital to modernize the fishing industry.

➢ Most of the fishing grounds like Lake Albert and Turkana are in remote areas which are inaccessible.

➢ Limited market for fish due to low income or cultural norms e.g. among the Bahima.

➢ Limited fish species of commercial value which reduces international demand.

➢ Over fishing and indiscriminate fishing through use of beach seining method which leads to catching of young fish.

➢ Excessive high temperature creates preservation difficulties.

➢ Political instability especially in Uganda which has scared away foreign investors.

➢ Threat of crocodiles especially on Lake Kyoga which scare away fishermen.

➢ Poor transport network linking to fishing grounds which leads to delays in delivery.

➢ Water hyacinth especially on Lake Victoria and Kyoga chokes fish to death.

➢ Competition with other fish producing countries like Norway Japan which leads to inadequate market.

➢ Un-desirable fishing methods like fish poisoning which causes health risks to the local people.

➢ Inter- territory conflict since some of the fishing grounds are found at borders e.g. Lake Albert, Lake Victoria, Tanganyika and Lake Malawi.

➢ Reduction of Tilapia doe to presence of Nile perch which eats them away.

➢ Some fishing grounds are too deep and hence don'tfavor fish multiplication.

➢ Water pollution by industries e.g. Nile breweries which causes death of the fish.

➢ Post fishing losses e.g. theft of their nets and fish catch.

STEPS THAT HAVE BEEN TAKEN TO SOLVE PROBLEMS FACING FISHING

❖ Formation of ministry of fisheries to control fishing activities in the country.

❖ Formation of fishing cooperatives for advice, loans and easy marketing.

❖ Educating the public about the value of the fish as a source of proteins and vitamins to increase its market.

❖ Removal of the water hyacinth by using chemicals to provide enough oxygen for the fish.

❖ There is construction and rehabilitation of road networks linking to fish grounds to improve fish deliveries.

❖ Treatment of sewage and industrial wastes to reduce water pollution.

❖ Setting strict laws prohibiting illegal fishing methods like poisoning and indiscriminate nets to protect the young fish.

❖ Introduction of modern fish preservation methods like freezing and canning by extending power to rural areas.

❖ Regular police patrols to reduce theft on water bodies.

❖ Introduction of commercial and high value fish species e.g. Nile Perch which have large market.

❖ Increased importation of fishing facilities such as motor boats and motor engines to increase efficiency.

❖ Construction of on-site fish processing plants e.g. Masese in Jinja and at Ggaba near Kampala to prevent fish from going bad.

❖ Artificial rearing of fish in ponds to reduce depletion of some species e.g. at Kajjansi and Entebbe.

Effects of fishing on the environment
➢ Smoking of fish and construction of boats requires timber which leads to deforestation.

➢ Fishing exposes fishermen to Tsetse flies and Bilharzia disease.

➢ Smoking of fish leads to atmospheric pollution which spreads human diseases like flue.

➢ Fishing leads to growth of towns which leads to high crime rates, unemployment and poor sanitation.

➢ Fishermen are exposed to dangerous water animals e.g. crocodiles on Lake Kyoga.

➢ Some fish which were introduced such as the Nile perch eat away other species like Tilapia.

➢ Poor fishing methods like use of poison may lead to health problems for humans.

➢ Processing industries that are constructed near water bodies have led to pollution due to dumping of wastes in the water bodies.

FISHING IN UGANDA

In Uganda, fishing is developed on Lakes, rivers and swamps. Lake Victoria is the most important fishing ground, followed by Lake Kyoga and Albert, Edward and George.The most common fish caught are Tilapia, Nile perch and Haplochromis.

❖ **FISHING ON LAKE VICTORIA**: a number of fishing Villages / ports developed on the Lake including Gomba, Bukakata, Kasenyi, Luzira, Kibanga, Kasensero, Jinja, Majanji, and Masese. Major fish species caught include tilapia, Nile perch and silver fish.

❖ **FISHING ON LAKE KYOGA:** This is the second important fishing ground. It's too shallow. Haplochromis, Tilapia and Nile perch are the most common fish caught. Others are Mud fish and Cat fish e.t.c. The lake is characterized by floating Islands of water Hyacinth and a big number of crocodiles which limit fishing.A number of fishing villages/ports developed including Lwampanga, Kachung and Nabyeso. Salting, smoking, sun drying and freezing are used in preserving fish.

❖ **FISHING ON LAKE ALBERT**: This is the third most important fishing ground. Tilapia, Nile perch are the most important fish caught. Fishing villages/ports on Lake Albert are:- Butiaba, Wanseko, Biseruka, Buliisa, Buhuka, Ntoroko, Ndaiga and Panyimur.

Salting and smoking are mainly used to preserve fish.

❖ **FISHING ON L AKE EDWARD AND GEORGE**: Fish caught include, Tilapia, Clarias, Bagrusprotopteruse.t.c. They presence of salt from Lake Katwe facilitates the use of salt topreserve fish though smoking is also applied.One of the problems facing fishing here is that Lake Edward is too deep, the area is infested with Tsetse flies, remoteness, poor transport facilities and fish smuggling to Democratic Republic of Congo. Major fishing ports are Rwenshama on Lake Edward and Magyo on Lake George.

❖ Fishing is also carried out in swamps e.g. lung fish and mud fish got from swamps along rivers like Katonga and Kagera.

FISHING IN KENYA

❖ Fresh water fishing grounds in Kenya include; - Lake Victoria, Lake Baringo, Lake Turkana, River Athi, Tana and Galana, fish ponds at Nyanza, in the central and western provinces at Homa bay.

❖ Marine fishing grounds arecentered only at the coast. These include**: -**Malindi fisheries, Lamu, Mombasa and the South Coast fisheries.Today, Kenya is the leading exporter of fish products in East Africa. Such products include:- Fresh or Frozen fish, Fish meal,Fish oil, Canned fish, Salted, smoked and dried fish.

❖ Some lakes in East Africa are too salty to contain fish. Such Lakes are barren, they include: - Magadi, Elmenteita and Natrone.t.c.

FISHING INTANZANIA

❖ Fresh water (Inland fisheries) include: Lake Victoria, Lake Tanganyika, Lake Rukwa and Rivers like Rufigi, Pangani, Malagarasi and Ruvuma. Fish caught are Tilapia, and Nile perch from Lake Victoria. Others areBagrus, Haplochromis. Bukoba, Mwanza and Musoma on Lake Victoria are the major fishingports.

❖ Lake Tanganyika is the second important fishing ground. Its popularity known for a small kind of fish called Dagaawhich are caught by use of bright lights at night (Lampara method).The fish are attracted to fish traps by artificial light and then scooped out. Other fish caught are Bagrus and Clarias. Kigoma is the major fishing port along the lake.

❖ Marine fishing is confined to the coast along the Indian Ocean, Mangrove Swamps and river estuaries.A lot of marine creatures like Shrimps, Oysters, crabs, Lobsters, Sardines and Herrings are caught.However, Marine fishing is not fully developed due to inadequate capital poor fishing equipment. Important fishing ports along the coast are: Mtwara, Lindi, Tanga and Dar-es-salaam.

Uses of fish

- Provision of food rich in proteins.
- Fish bones can be used for making buttons.
- Used for making cosmetics and soap.
- Used for making animal feeds like chicken feeds.
- Fish fats can be used for making edible cooking oil.
- Fish bones and scales can be crushed to make fertilizers.
- Used in the making of drugs/medicine.
- Fish skin can be used as a leather material for making shoes, bags and belts

TRANSPORT AND TRADE IN EAST AFRICA

❖ Transport is the movement of people and goods and services from one place to another.

❖ There are four types of transport systems in East Africa.

➢ Land transport where people use; roads, railways, human porterage& animals.

➢ Air transport

➢ Water transport

➢ Pipeline transport

1. RAILWAY TRANSPORT

▪ This is mainly developed for the purpose of transporting bulky commodities. In east Africa, there are 3 major railway lines;

i) Kenya-Uganda railway

ii) Tanzam-Tazara railway.

iii) Central Tanzania railway (Dar-es-salaam-Kigoma railway)

ADVANTAGES

✓ It's cheaper compared to road transport.

✓ Cheapest means to transport bulky commodities over long distances.

✓ It's not affected by traffic congestion.

✓ It's very convenient since it has specific time schedules.

DISADVANTAGES

• It's generally slow compared to air and road transport.

• Rails are expensive to build and maintain.

• It's not flexible because it cannot be used where rails don`t exist.

• Rails are almost restricted to generally flat land surfaces.

ROLE OF RAILWAY TRANSPORT TO ECONOMIC DEVELPOMENT OF EAST AFRICA

❖ Promotes cross border trade between the East African countries hence increasing revenue.

❖ Promotes regional co-operation amongst the East African countries which promotes peace.

❖ Provides government with revenue through custom duties for national development.

❖ Provides employment opportunities e.g. engineers, police officials hence improved standards of living.

❖ Promotes industrial growth through the distribution of industrial goods to market centers.

❖ Promotes agriculture through linking farms to market centres.

❖ Open up remote areas for development leading to regional balance e.g. southern Tanzania.

❖ Facilitates movement of labour force through passenger transportation.

N.B. railway transport has greatly declined in Uganda due to vandalisation/theft of rails especially the route from Kampala to Kasese.

2. ROAD TRANSPORT

• It's the most common means of transport.

ADVANTAGES

✓ It's the most flexible means i.e. can connect to all areas and offers a wide range of alternatives e.g. bicycles, cars, Lorries e.t.c.

✓ It's faster than railway transport.

✓ It's the best to transport bulky commodities over short distances.

✓ Roads are cheaper to construct than airports and railways.

DISADVANTAGES

• Relief features like hills and swamps make road construction very difficult.

• Traffic congestion is very common on roads leading to delays.

• Accidents are more common on roads than any other means of transport leading to loss of lives.

• Poor road surfaces due to poor work man ship is the major problem faced by roads.

• The roads require constant maintenance which is expensive.

• It is affected by insecurity in terms of highway robbers leading to losses.

• Dry weather roads are affected by heavy rainfall making them impassable.

Role of road transport to economic development

❖ It has helped in development of fishing by linking landing sites to market centers.

❖ Promotes agriculture by linking rural areas to urban markets.

❖ Promotes cross border trade between the East African countries hence increasing revenue.

❖ Promotes regional co-operation amongst the East African countries which promotes peace.

❖ Provides government with revenue through custom duties, road licenses and driving permits for national development.

❖ Provides employment opportunities e.g. engineers, police officials hence improved standards of living.

❖ Promotes industrial growth through the distribution of industrial goods to market centers and transportation of raw materials.

❖ Promotes tourism by connecting to all tourist sites in the remote areas.

❖ Facilitates easy exchange of ideas necessary for national development.

❖ Helps to diversify the economy by promoting several activities e.g. lumbering and fishing which ensures high capital inflow.

❖ Promotes linear settlement pattern along roads which leads to urbanisation and its advantages e.g. setting up of schools.

3. **AIR TRANSPORT**

• Most important airports in East Africa are;

i) Entebbe international airport in Uganda.

ii) Jomo Kenyatta/Embakasi in Nairobi and Mombasa airport in Kenya.

iii) Dar-es-salaam, Arusha and Moshi in Tanzania.

N.B. Jomo Kenyatta/Embakasi airport in Nairobi is the most important and has got the most connections and busiest schedules in East Africa.

ADVANTAGES

✓ It's the fastest over long distances especially across borders.

✓ It's very comfortable and less tire some.

- ✓ It's suitable for carrying high value commodities e.g. drugs, army weapons, computers and optical items e.g. watches.
- ✓ It's the best for transporting perishable goods/commodities e.g. flowers, fish and vegetables.
- ✓ It's not affected by traffic congestion.
- ✓ It's always on strict time schedule hence reducing delays.
- ✓ Doesn't require construction of the path ways/routes for aero planes.

DISADVANTAGES
- It's the most expensive.
- In case of an accident, chances of survival are very minimal.
- It's not flexible because it's not readily available in all areas.
- It's not effective in transporting bulky goods/ commodities.
- It's affected by poor weather e.g. fog leading to accidents.

ROLE OF AIR TRANSPORT IN ECONOMIC DEVELOPMENT
- ❖ It helps to promote tourism by transporting foreign tourists.
- ❖ It promotes international relationships which ensure world peace.
- ❖ It promotes international trade which increases government revenue for national development.
- ❖ Through international trade, it helps to promote agriculture which is the major activity in East Africa.

4. WATER TRANSPORT
- ▪ This is the cheapest means of transport. It takes place on inland lakes and rivers and on the Indian Ocean.

N.B: River Nile is not used for water transport in Uganda because it's not navigable due to many waterfalls and rapids e.g. Bujagali, Owen falls, Rippon falls and Karuma falls.

N.B: A number of ports have been developed on major water bodies to ease water transport e.g. of inland ports include;
a) Lake Victoria has got several ports which include: Musoma, Kisumu, Port bell (Luzira), Mwanza, Bukoba, Majanji and Kasensero.
b) Lake Albert has got: Butiaba, Wanseko, Buliisa, Ndaiga, Panyimur and Ntoroko.
c) Lake Edward has got Rwenshama.
d) Lake Kyoga has got Kachung, Lwampanga and Nabyeso.
e) Lake George has got Magyo.
f) Lake Tanganyika has got Kigoma.
g) Coastal Ports include: Mombasa, Dar-es-salaam, Tanga, Malindi, Lamu, Mtwara and Lindi.

ADVANTAGES OF WATER TRANSPORT
- ✓ It's the cheapest.
- ✓ It's not affected by traffic congestion.
- ✓ Water ways are naturally availed hence saving costs of construction.
- ✓ It can be used to transport bulky commodities e.g. timber.
- ✓ It connects distant areas e.g. islands.

DISADVANTAGES
- It's only restricted to areas with only lakes and rivers i.e. not flexible.
- Accidents in water due to strong waves and poor visibility claim many lives.
- The water hyacinth and papyrus hinder navigation.

- Some rivers are seasonal and can't be used during the dry period e.g. river Mayanja.
- Water transport is very slow compared to road transport.
- Many rivers are not navigable because of waterfalls and rapids e.g. river Nile.

Role of water transport in economic development
❖ Promotes fishing due to easy movement on water bodies.
❖ Promotes agriculture by linking agricultural islands to market areas e.g. Kalangala.
❖ Promotes lumbering by helping in the distribution of timber products.
❖ Promotes cross border trade between the East African countries hence increasing revenue.
❖ Promotes regional co-operation amongst the East African countries which promotes peace.
❖ Provides government with revenue through custom duties for national development.
❖ Provides employment opportunities e.g. engineers, patrol officials hence improved standards of living.
❖ Promotes industrial growth through the distribution of industrial goods to international market centers.
❖ Promotes tourism by connecting to all tourist sites in the island areas e.g. Kalangala.

5.   PIPELINE TRANSPORT
▪ This involves the transportation of gases, water and oil using pipes. It is highly used in urban centres for transporting domestics and industrial water through pipes e.g. water used in Kampala is mostly transported by pipelines from Ggaba on the shores of Lake Victoria.
▪ Pipelines are also used in transporting oil (petroleum) from Mombasa to Eldoret via Nairobi.
▪ Another pipeline was constructed from Dar-es-salaam to Kapiri-Mposhi in the Zambia copper belt to transport oil.

Advantages of pipeline transport
✓ It is a cheaper means of transporting liquids and gasses.
✓ It can be used to transport large volume of liquids and gasses ata single time.
✓ It is more reliable since it can even be used in politically unstableregions.
✓ It does not pollute the environment unlike roads and railways.

FACTORS INFLUENCING THE DISTRIBUTION OF MAJOR TRANSPORT NETWORKS IN EAST AFRICA
➢ Government policy whereby it can be for political or economic reasons. Areas that are economically viable will encourage government to construct roads and railways to exploit the resources.
➢ Regions with abundant economic potential e.g. mining centers tend to have more roads and railway lines compared to unproductive areas.
➢ Areas which are urbanized and are densely populated always have more transport routes than sparsely populated areas.
➢ Climate whereby areas with heavy rainfall tend to have better roads since they are affected by floods than in areas with dry conditions. However, areas which receive heavy rainfall will also make road construction very difficult due to soft ground.
➢ Relief whereby steep areas make road and railway construction very difficult compared to low lands and flat areas which make road construction very easy.
➢ Drainage whereby areas with poor drainage e.g. swamps are avoided during road construction while well drained areas e.g. gentle slopes make it easy for road and railway construction.
➢ Areas with dense vegetation cover e.g. tropical rain forests will discourage road and railway construction while areas with savannah vegetation will attract road and railway construction. However government will always construct roads leading to forests so as to develop lumbering activities.
➢ Areas with water bodies like lakes and rivers will discourage road construction but instead lead to development of water transport.

➢ Flat areas also attract construction of airports compared to hilly areas which discourage construction of airports and airfields.

➢ Areas with fertile soils will attract large population which leads to construction of roads and railways unlike areas with infertile soils.

➢ Areas with tourist attractions will attract roads and airfields to ease movement of tourists unlike areas without major tourist attractions.

➢ Availability of capital: where there is enough capital for construction of transport means, government will always develop them than when there is inadequate capital for road construction.

Effects of transport on the environment

• Pollution from vehicles emitting fumes and oil spills from ships into water bodies.

• Smoke and smog have caused poor visibility.

• Creation of barren lands where rocks have been excavated e.g. along river channels.

• Increased temperatures/Global warming due to gas emissions.

• Loss of bio-diversity i.e. migration of water animals and bird species due to pollution.

• Destruction of forests and swamp reclamation to create land for roads and railways.

• Displacement of many people due to the need to expand roads and railway lines.

• Encroachment on land for other land uses like fishing, forestry and agriculture.

• Destruction of scenic beauty of landscape by removing vegetation and rocks.

• Land degradation e.g. through stone quarrying which leaves behind pits that are breeding grounds for mosquitoes.

A SKETCH MAP OF EAST AFRICA SHOWING COMMUNICATION AND TRANSPORT ROUTES.

KEY

1	Lake Victoria
2	Kisumu Port
3	Mtwara Port
A	Dodoma town
B	Gulu town
C	Entebbe Airport
D	Nairobi Airport
4	Uganda Railway

⌒	Roads
++++	Railways
⊗	International Airport
•	Towns
····	Shipping Routes

Problems facing the transport sector in East Africa

➢ Inadequate capital to establish and improve the transport and communication networks.

➢ Inadequate skilled manpower to help in the construction of transport and communication networks.

➢ Low levels of technology used to construct transport and communication lines.

➢ Steep relief in mountainous regions which makes it expensive to construct roads and railways.

➢ Physical barriers e.g. rivers, forests and deserts make the construction of transport lines very difficult.

➢ Harsh climatic conditions e.g. heavy rains lead to floods hence making roads impassable while mist and fog hinder air and water transport.

➢ Political instability e.g. wars make road construction very difficult and also during the wars, roads and railway lines are destroyed.

➢ Corruption and embezzlement of funds by ministry of transport and communication officials hence leading to poor roads.

➢ Poor government policies whereby roads, waterways and airfields are only constructed in areas where prominent politicians come from and other areas are neglected.

➢ Differences in political ideology whereby countries impose strict restrictions and deny easy access to sea ports by land locked countries e.g. Uganda.

➢ Areas with clay soils have made road construction very difficult and expensive.

➢ It's very expensive to compensate people incase their land is to be taken by government to expand existing roads.

Solutions to the above problems

❖ Securing loans and grants from World Bank and developed countries to provide more capital for investment in transport development.

❖ Hiring expatriates who can construct modern and better roads and railways.

❖ Encourage training of local personnel to ensure enough skilled labour.

❖ Importation of modern tools and technology for constructing of modern roads and railways.

❖ Construction of tunnels and use of cable cars to be used in areas with steep relief.

❖ Flushing out rebels and strengthening security to create peace which attracts investment in the transport sector.

❖ Fighting corruption by strengthening government organs e.g. police, parliament and Inspector General of Government (I.G.G).

❖ Ensuring balanced regional development and encourage equal resource exploitation for national development.

❖ Formation of regional blocks e.g. East African Community (E.A.C) to remove borders restrictions.

TRADE IN EAST AFRICA

❖ Trade is defined as the buying and selling of goods.

Characteristics of trade within East Africa

▪ There has always been a considerable amount of trade between the East African countries.

- They have supplied each other with goods, which they cannot themselves produce.
- Until recently, Kenya was the largest supplier since it had developed many industries in Nairobi, Nakuruand Mombasa.
- Kenya supplied Uganda and Tanzania a lot of manufactured goods and chemicals.
- In return, she imported food especially maize and Tobacco from Uganda and food, oils and manufactured goods from Tanzania.
- Kenya also imports electricity from the Nalubale power station formerly Owen falls dam power station but this is likely to decrease once Kenya expands her own power station at Seven forks dam on river Tana.
- The quantity of goods Kenya imports from Uganda and Tanzania are less than what it exports to the two countries.
- This has forced Uganda and Tanzania to put in place tariff barriers on many imported goods from Kenya, so that their own young industries can develop.
- Today these countries can export manufactured goods to Kenya as well.

The main export commodities of the East African countries

1. KENYA: The main export Commodities from Kenya are coffee, tea, pyrethrum, maize, hides and skins ,wattle, soda ash, sisal, cement, vegetables, cotton and fuel. Most of the agricultural produce of the country are exported. The fuels exported are the refined petroleum products like petrol, diesel, paraffin which are re-exported from the refinery at Mombasa.

2. TANZANIA: Tanzania's exports include: Coffee, cotton, diamond, sisal, cloves, Cashew nuts, Tea, Tobacco, Pyrethrum, Copper, hides and skins, meat and fuel from the refinery at Dar-es-salaam.

3. UGANDA: Uganda's exports include: coffee, Cotton, Cobalt, Gold, Tobacco, Sugar, Hides and skins, vegetables and animal feeds.

N.B:

➢ Agricultural produce constitutes a big percentage of total exports while manufactured goods, machinery, fuels, chemicals, crude materials like oil for processing constitute the biggest percentage of the imports into the region.

➢ Such a trend implies a low level of industrialization and agricultural dependence.

Steps taken to encourage export trade and reduce import trade

✓ The three countries are building manufacturing industries (export promotion industries) to enable them stop importing manufactured goods.

✓ Heavy duties (taxes) are levied on imported manufactured goods to discourage their demand on the local market as well as protect the local infant industries.

✓ Foreign investors are attracted to set up big industries in the region by giving them tax holidays.

✓ Tax holidays are also given to infant industries to enable them to start producing goods locally.

✓ Formation of regional blocks e.g. East African Community (E.A.C) to encourage cross-border trade without many restrictions.

✓ Carrying out extensive market research to diversify the markets and create more demand abroad for locally made items.

✓ Increased advertisements through international media to create awareness about East Africa's products which increases demand.

✓ Ensuring political stability which has attracted more foreign investors to set up industries in East Africa.

✓ Encouraging economic diversification by government to reduce dependence on

agriculture and encourage industrial development.

N.B: the three countries are trying their best to develop both visible trade and invisible trade.

- Visible trade is the trade in imports and exports of tangible products like agricultural and manufactured goods.

- Invisible trade refers to the trade in services such as tourism, health, labour and education.

Benefits of trade in East Africa

❖ Trade has stimulated the growth of industries which lead to economic diversification.

❖ It leads to development of transport facilities, financial institutions like banks and insurance companies which lead to urbanization.

❖ Agriculture has been largely modernized which has ensured increased supply of food.

❖ Trade has led to regional co-operation which has boosted peace in the region.

❖ Government earns revenue through taxes and tariffs across borders which it uses for national development.

❖ Trade has encouraged full resource utilization which has ensured constant capital inflow.

❖ Ideas have been exchanged through trade relationships which has boosted national development.

❖ Government is able to earn foreign exchange through export trade which is used for developing infrastructures e.g. roads.

❖ It has encouraged exploitation of natural resources even in remote areas which also leads to regional balance.

❖ Through international trade, East Africa is able to acquire commodities that it doesn't produce e.g. drugs, cars and computers.

❖ Expatriates are hired form developed who trained
local people hence leading to skill acquisition by the locals.

❖ Employment opportunities have been created through trade leading to improved standards of living.

Factors that encourage inter-state trade/international trade in East Africa

▪ Differences in natural endowments especially raw materials e.g. Uganda has more agricultural raw materials but less high value minerals.

▪ Specialization also leads to inter-state trade e.g. Uganda has specialized in agricultural exports while Kenya produces more manufactured goods.

▪ Differences in levels of development e.g. Kenya has a highly developed industrial sector than Uganda and Tanzania.

▪ Presence of developed means of transports e.g. roads and railways which help to promote cross-border trade.

▪ Outbreak of political unrest in one country reduces her level of production hence leading to international trade e.g. Uganda.

▪ Formation of the East African Community which encourages peaceful trade relationships among the member countries.

▪ Outbreak of natural disasters in one country can also lead to international trade to get essential goods like basins, mattresses and blankets e.g. Bududa landslides.

▪ Differences in climate also lead to inter-state to get food e.g. Uganda provides a lot of maize to Kenya.

▪   The need to earn government revenue through customs duty and trade licenses also leads to inter-state trade.

▪   The need to dispose of surplus produce also leads to inter-state trade in a bid to create market for the produced items.

INDUSTRIALISATION IN EAST AFRICA

❖   Industrialization is a process through which countries increasingly become involved in the production of manufactured goods.

❖   Manufacturing is the processing and changing of raw materials into a new product.
      There are three types of industries in East Africa:

➢   **Primary industries**: These are also called extractive industries. They include: Quarrying, Fishing, Lumbering, Mining, Agriculture e.t.c. They are the most dominant industries in East Africa. They mainly provide raw materials.

➢   **Secondary industries:** These are industries that turn raw materials into consumer or finished goods. They include: sawmilling, textiles, Steel rolling mills, chemical industries e.t.c.

➢   **Tertiary industries:** These are industries involved in providing services. These include: Transport and communication, Health, Education, Banking, Insurance and Tourism.

NB: Most of industries in East Africa are located in towns or cities.

▪   A site of a town is the land on which a town stands.

▪   The situation of a town or city shows its wider position and links with other places.

Industrial Town		Industries
1.	**Kampala**	Grain milling, breweries, beverages, steel rolling, cigarette making, fish processing, textile, motor engineering, plastics, printing and publishing, chemical industries and pharmaceutical.
2	**Jinja**	Grain milling, textile, motor engineering, printing and publishing, food processing, soft drinks and beverages, breweries, paper making, sugar refining and fish processing.
3.	**Mukono**	Breweries, fish processing, Printing and publishing, tea processing, saw milling and food processing.
4.	**Mbale**	Beverages, pulp and paper, printing and publishing, leather tanning, coffee processing, confectionaries.
5.	**Nairobi**	Pharmaceuticals, car assembly, chemicals and plastics, foot wear, cigarette making, breweries, food processing, grain milling, printing and publishing and grain milling.
6.	**Mombasa**	Cement factory (Bamburi), car assembly, oil refining, ship building and repair, food processing, soft drinks and beverages.
7.	**Dar-es-salaam**	Printing and publishing, ship building and repair, oil refining, grain milling, soft drinks and beverages, food processing and motor engineering.
8.	**Port Mtwara**	Chemical industries, salt works, saw milling, ship repairs, food processing and printing and publishing.
9.	**Kisumu**	Cement making, textiles, food processing, motor engineering and printing and publishing.
10.	**Kasese**	Chemical industries, cement making, food processing, lime works and mattress manufacture.

N.B. Other industrial towns in East Africa are: Arusha, Nakuru, Thika, Moshi, Mbeya, Tabora, Mwanza, Kigoma, Mbarara, Tororo, Tanga and Eldoret.

INDUSTRIAL TOWNS IN EAST AFRICA.
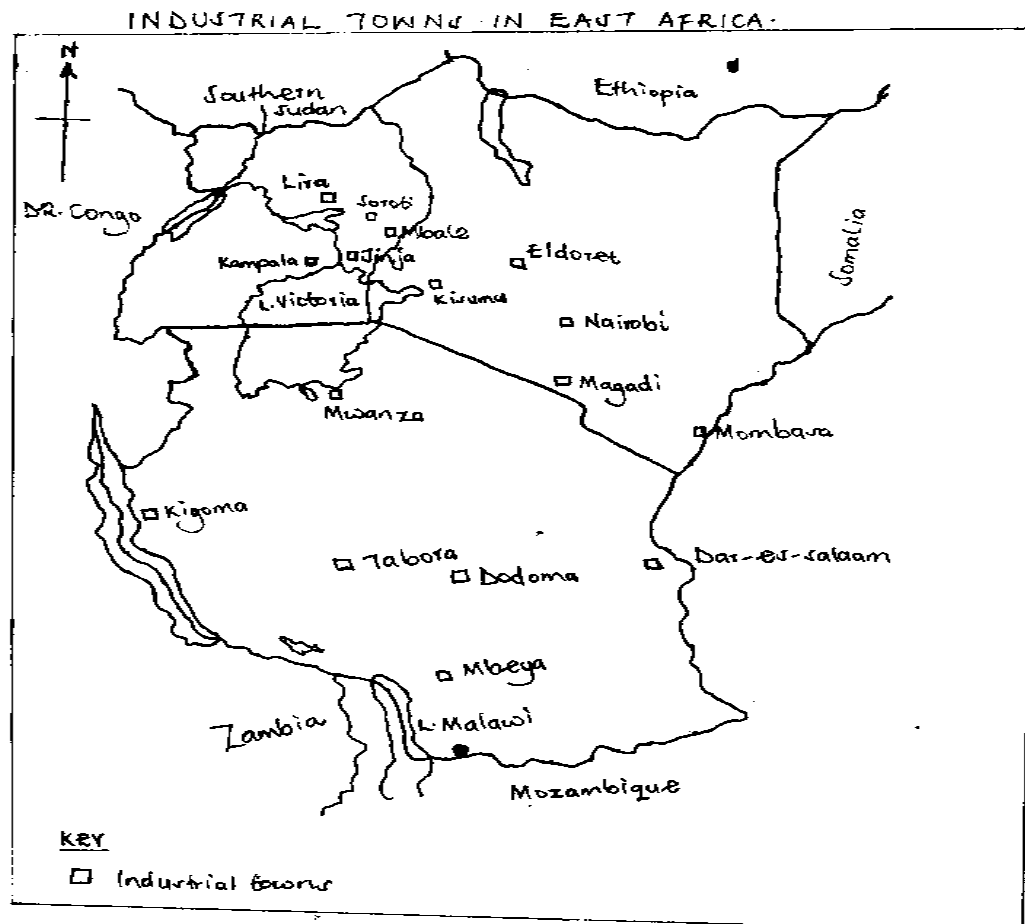
Factors/conditions that have influenced the development of industries in East Africa

✓ Presence of abundant supply of power for running machines e.g. thermal, solar and Hydro electricity.

✓ Presence of a variety of agricultural and mineral raw materials for processing into finished products e.g. limestone and coffee.

✓ Presence of enough skilled and unskilled labour force to work in the industries e.g. engineers.

✓ Efficient transport network by road, rail and water for transporting raw materials to industries and manufactured goods to markets.

✓ Availability of ready market for the manufactured goods which is both local and international e.g. Southern Sudan.

✓ Availability of abundant water used as a raw material or for washing and cooling machines e.g. in breweries and soft drinks factories.

✓ Industrial inertia where industries are concentrated in areas where others exist so as to share mechanics, roads, security and electricity.

✓ Supportive government policy that encourages investment in industries e.g. allocating certain areas for industrial development e.g. at Namanve.

✓ Wide publicity due to effective advertisement for industrial products which has created high demands e.g. through television and radio adverts.

✓ Availability of modern technology used in the manufacturing industries e.g. use of

computers.

✓ Improved political stability which has attracted foreign investors to set up industries in East Africa.

✓ Presence of adequate and extensively flat land for industrial establishment e.g. at Namanve, Kyambogo and Nakawa

✓ Availability of adequate capital to invest in industrial

Benefits of industrial development

• Created employment opportunities to workers hence improving their standards of living e.g. engineers.

• Provided cheap manufactured goods which are essential to the people e.g. furniture, cement and plastics.

• Industries are a source of government revenue through taxation used for development of infrastructures e.g. roads.

• Industrial goods are exported to earn government foreign exchange used for national development e.g. setting up hospitals.

• Facilitates development of infrastructures like roads, schools and hospitals which provide social services to the people e.g. education and health.

• Industries lead to economic diversification for an increased income in flow for government and reduce dependence on agriculture.

• Industries lead to exploitation of natural resources like agriculture and minerals which leads to self sufficiency.

• Industries promote international relationship between East Africa and her trade partners which promotes world peace.

• Infrastructures developed in industrial cities have led to growth of urban centers e.g. Kampala, Nairobi and Dar-es-salaam.

• Industries have stimulated agricultural development by providing market for farm raw materials e.g. milk, wheat, cotton and tea.

• Industries are used as research and study centers for students on field work which widens the scope of knowledge.

• People have acquired skills through job training in industries which they use for survival e.g. operating machines.

Limitations to industrial development in East Africa

❖ Low market for domestic industrial goods due to competition with high quality and low priced goods from developed countries like Britain, Japan and U.S.A.

❖ Inadequate capital for investment in establishing and managing industries.

❖ Shortage of skilled labour force to work in industries like Technicians and Engineers.

❖ Political instabilities especially in Uganda which led to closureof some industries e.g. Gulu foam for making mattresses.

❖ Poor transport facilities which hinder quick transportation of raw materials andmanufactured goods.

❖ Irregular electricity supply to run industries due to frequent load shedding which brings activities to a standstill.

❖ Unfavourable government policies which discourage industrial development e.g. heavy taxes imposed on industries.

❖ East Africa lacks some raw materials for heavy industries which leads to dependence on importation e.g. iron ore and petroleum.

❖ Most industries are owned by foreigners who don't re-invest their profits within East

Africa leading to slow growth of industries.

Solutions to the above problems

➢ Government should seek aid and grants from development countries to widen the capital base for industrial development.

➢ Investments should be made in research and exploration to get new sources of raw materials.

➢ International advertisements should be done to widen market for locally manufactured goods.

➢ Government should improve transport facilities in the industrial areas to ensure high output e.g. upgrading roads from murram to tarmac.

➢ Enforcing security to ensure political instability which attracts more foreign investors.

➢ The government should encourage research to produce high quality products that have market demand.

➢ New courses should be introduced at different learning institutions to produce enough skilled labor force to work in industries.

➢ Diversification of the economy to reduce dependence on manufacturing industries e.g. tourism.

➢ Government should carry out extensive market research to get new markets for East Africa manufactured products.

Effects of industrial development on environment in East Africa

▪ Atmospheric pollution through industrial fumes and dust especially by the cigarette making, cement making and textile industries.

▪ Noise pollution by industrial machines.

▪ Water pollution through disposal of industrial wastes in water bodies e.g. Lake Victoria.

▪ Encroachment on swamps which distorts the water cycle because swamps help in filtering water.

▪ Clearing of forests like at Namanve and Mabira for industrial space which leads to desertification.

▪ Destruction of habitat for wild animals and birds through deforestation and swamp reclamation.

▪ Led to increase in value of land which has limited land for expansion of settlements.

▪ Development of slums with their associated evils like prostitution e.g. in Kibera near Nairobi and Katwe near Kampala.

▪ Construction of many buildings and tarmac roads has led to increase in world temperatures which lead to global warming.

▪ They have promoted rural-urban migration which has reduced food production in villages leading to food insecurity.

▪ Industrial fumes have led to formation of acid rains near towns which don't support crop growing.

▪ Through deforestation, rainfall totals have greatly reduced which has led to long dry spells and drought.

CHARACTERISTICS OF INDUSTRIES IN EAST AFRICA

• They mainly use Hydro Electric Power as the source of energy.

• They are mainly set up near the power source e.g. Jinja, Kampala and Nairobi.

• They are mainly owned by foreigners e.g. Madhvani industries.

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- Most industries are labour intensive i.e. use more of human labour force than machines.
- They produce low quality goods which are less demanded internationally.
- They are on small scale because of low market base.
- They use out-dated machinery which leads to poor quality products.
- Most industries are extractive (primary) and hence produce raw materials.
- They mainly produce for the local market and very little is exported.

ENERGY IN EAST AFRICA

❖ Energy can be defined as the power used to drive machines. It can beclassified into two;

(a) **Renewable sources of energy:** This is the source of energy which can be tapped at any time without reducing the amount available for future use. It includes: Hydroelectricity, Solar, Biogas and wind energy.

(b) **Non Renewable sources of energy:** These are sources of energy which can be used up. They include: Natural gas, Petroleum, Coal and Uranium.

Production of Hydroelectricity power

▪ This is the most used source of energy in East Africa especially for large-scale industries.

▪ It'salso used in lighting houses and for communication.

▪ It is generated through construction of dams along a waterfall on ariver e.g. Owen falls dam and Bujagali dams on river Nile (Uganda), seven folks dam on river Tana (Kenya) and Hale power project on river Pangani (Tanzania).

Factors favoring construction of Hydro electricity dams

➢ Constant supply of water from a river used for running the turbines.

➢ A steep gradient along the river with a waterfall and rapid running water for the establishment of the dam.

➢ Presence of strong and hard basement rocks for supporting the dam.

➢ Presence of a narrow gorge through which a river flows to increase the speed of water.

➢ Large amounts of capital for investment in dam construction e.g. buying turbines.

➢ Availability of enough skilled labour force to construct the dam.

➢ Plenty of building materials like cement, sand and hardcore stones used for constructing the dam.

➢ Enough land which should be flat enough to allow the flooding of the river after the dam has been constructed.

➢ Ready market for the electricity to be produced both local and international e.g. homes and industries.

➢ Supportive government policy of investing in dam construction to ensure supply of electricity.

➢ Presence of advanced technology used in the construction of the dam e.g. use of excavators.

➢ Efficient transport network by railway to transport machinery and other raw materials used in dam construction.

Importance of dam construction

✓ Generation of Hydroelectricity for domestic and industrial use.

✓ Water reservoir that is created behind the dam provides water for irrigation purposes.

✓ Creates employment opportunities to engineers and technicians hence improved standards of living.

✓ Helps to control river flooding and its effects like destruction of property e.g. along River Tana and River Nile.

✓ Stimulates the growth of towns due to establishment of industries.

✓ Creates a fishing ground along the reservoir behind the dam which provides food.

✓ Dams are tourist attractions which promotes tourism hence earning government a lot of foreign exchange.

✓ Dams are used for study purposes e.g. geography students and engineering studies which expands knowledge.

Effects of dam construction

• Destruction of natural beauty of the landscape e.g. waterfalls.

• Flooding of the area behind the dam during the construction process.

• Outbreak of water borne diseases like bilharzia due to the water reservoir behind the dam.

• Many workers usually drown along the river during the process of dam construction.

• Interference with aquatic life when water is blocked which reduces fish multiplication.

• Deforestation is carried out to get timber used during the process of dam construction.

• Industrial cities that grow near dams are faced with pollution and congestion
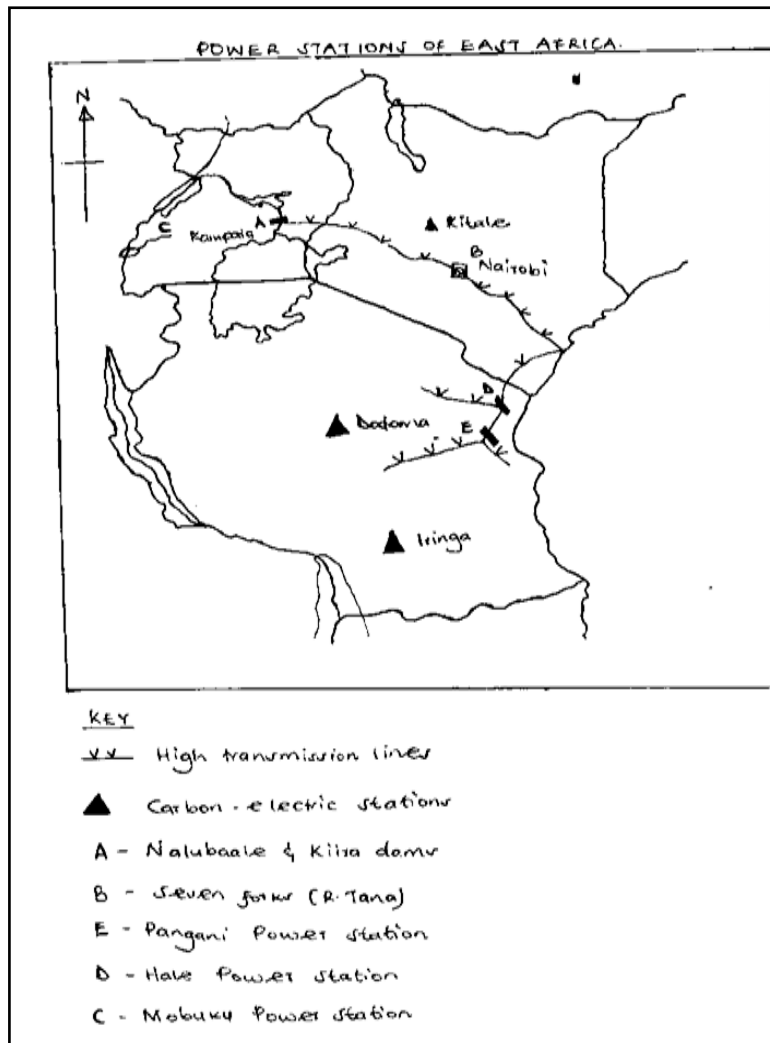
Advantages of Hydro electricity

▪ It is a renewable source of energy and can be used for a very long time.

▪ It doesn't pollute the environment.

▪ Can be put to several uses e.g. lighting, running machines and communications.

▪ Easy to control and use through switches.

Disadvantages

➢ It's very dangerous when mishandled and leads to deaths through electric shock.

➢ It is expensive to use in terms of electricity bills.

➢ It's expensive to transmit through long distances

➢ It needs constant maintenance and repairs e.g. replacing rotten poles and old transformers.

➢ Requires highly skilled manpower to maintain and do repairs.

➢ Leads to destruction of property in case higher voltage is transmitted.

N.B

• Other falls in Uganda which can be used to generate Hydroelectricity are:Sipi falls on River Sipi on Mt. Elgon and Kabalega falls on Victoria Nile.

• The Seven Forks H.E.P Project in Kenya is located along River Tana with a number of dams which include: Masinga, Kamburu, Kindaruma and Gtaru.

• Other dams producing electricity in Tanzania are Wami II dam and Wami I dam on river Wami and Mtonga dam on River Ruvuma.

POWER STATIONS OF EAST AFRICA.

KEY
✓✓ — High transmission lines
▲ Carbon - electric stations
A - Nalubaale & Kiira dams
B - Seven forks (R. Tana)
E - Pangani Power station
D - Hale Power station
C - Mobuku Power station

URBANISATION IN EAST AFRICA

❖ About 30% of East Africa's population lives in urban centers.

❖ The rapid growth and development of these ports and towns in the recent years has been as a result of rural-urban migrations where capital cities have become primary destinations for majority migrants.

❖ The major urban centers in East Africa are Kampala, Nairobi and Dodoma which are capital cities.

❖ Port cities that have developed into urban centers are Kisumu, Mwanza, Bukoba, Musoma, Jinja, Mombasa, Dar-es-salaam, Kigoma, Tanga and Mtwara.

❖ Other urban centers in East Africa include: in Uganda there is Mbale, Kasese, Mbarara, Tororo, Gulu, Soroti, Lira, Masaka, in Kenya there is Thika, Eldoret, Nakuru, Kitale, and in Tanzania there is Mbeya, Songea, Tabora, Shinyanga, Makumbako, Kilosa, Ifakara, Arusha and Moshi.

Factors that have favoured the development of urban centers in East Africa

➤ The abundant supply of clean and fresh water for domestic and industrial use e.g. Kampala, Nairobi and Mbale.

➤ Availability of large tracts and vast land for the establishment of the urban center.

➤ Relatively flat and gently sloping land for establishment of the urban center e.g. Kampala and Nairobi.

➤ Historical factor whereby most towns developed as a result of early contacts with colonialists and Arabs for trade e.g. Mombasa, Nairobi and Kampala.

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➢ Presence of a rich and productive agricultural hinterland for industrial development e.g. Mbale, Soroti, Nairobi and Kampala.

➢ Supportive government policy for developing the urban center e.g. in Tanzania, the capital city was transferred to Dodoma from Dar-es-salaam.

➢ The presence of many industries which provide jobs that have attracted many people into the cities e.g. Jinja, Nairobi, Mombasa and Kampala.

➢ Cool and conducive climate which is favourable for human survival e.g. Nairobi, Mbale and Kampala.

➢ Presence of improved and better security which attracts large population e.g. Nairobi, Kampala, Gulu and Mbale.

➢ Presence of well-developed and modern transport network which eases movement of goods and services e.g. roads and railways.

➢ The large population size has provided cheap labour and large market hence boosting industrialisation.

➢ Availability of large sums of capital for investment e.g. buying land and putting up infrastructure e.g. roads.

➢ Constant supply of cheap and abundant power for use in the urban centers e.g. in industries and homes.

➢ Presence of a variety of better amenities which attract large population size e.g. schools, hospital, theaters and tall buildings.

➢ Central location which makes the towns accessible from all parts of the country e.g. Kampala, Nairobi and Dodoma.

Functions of urban centers

✓ They serve as administrative centers e.g. with government offices like Parliament, Ministries and Non-Governmental Organisations.

✓ They provide educational services to people e.g. in schools, universities and colleges.

✓ They provide recreational and leisure services to people e.g. in theaters, cinemas, stadiums and concert halls.

✓ They serve as tourist centers which earn government foreign exchange e.g. Kasubi tombs in Kampala and Fort Jesus at Mombasa.

✓ They serve as commercial and trading centers with many businesses e.g. in shopping malls, supermarkets and forex bureaus.

✓ They provide residential services to the people for accommodation e.g. in the tall buildings found in these towns.

✓ They are industrial centers which provide jobs to the people e.g. Dar-es-salaam, Kampala, Mombasa, Nairobi and Jinja.

✓ They provide financial and banking services which boost trade e.g. credit micro-finance institutions, central banks and ware houses.

✓ They provide transport service by having major transport terminals e.g. railway and road terminals in Kampala, Nairobi and Dodoma.

Effects of urbanisation on the environment

• Destruction of vegetation due to increased competition for land for industrial development and settlement.

• Loss of vegetation cover has accelerated soil erosion and siltation of water bodies.

• Loss of vegetation has led to changes in micro climate e.g. reduced rainfall totals.

• Loss of vegetation cover has also increased flooding e.g. in Kampala.

- Loss of habitats for wildlife e.g. crested cranes, snakes and birds due to destruction of vegetation.
- Loss of bio-diversity e.g. death of wild animals like frogs through destruction of swamps and forests.
- Water table is lowered due to loss of vegetation leading to water crisis.
- Increased human settlement has brought about increased waste which leads to poor sanitation and easy spread of diseases.
- Domestic and industrial wastes have led to increased air, water and land pollution.
- Swamp reclamation due to shortage of land for settlement and industrial development e.g. Kampala.
- Increased demand for building materials has led to destruction of vegetation and environmental degradation e.g. blasting of rocks.
- Concentration of buildings and concrete surfaces has led to increased heat hence global warming.
- Presence of too much dust and smoke in urban centers increase the formation of acid rains which don't support farming.
- Creation of green belts has created good scenic beauty of the environment e.g. constitutional square in Kampala.
- Quarrying for sands and concrete rocks creates pits and depressions which act as breeding grounds for mosquitoes and snails.
- Noise pollution from vehicles and recreational facilities e.g. concert halls.
- Increased surface run-off in times of heavy rains which leads to soil erosion.

Steps being taken to solve the environmental effects above
- Setting anti-pollution laws to reduce pollution e.g. treating industrial wastes.
- Attracting many Non-Governmental Organisations to teach people about environmental conservation.
- Encouraging urban planning efforts to streamline landuse and reduce destruction of vegetation e.g. avoid settlements in swamps.
- Constructing high-rise or storied buildings to utilise available space and reduce competition for land.
- Introducing urban-rural strategies to stop rural-urban migration e.g. construction of roads, hospitals and schools in villages.
- Improvement of drainage channels within urban centers to reduce poor sewage disposal and water pollution.
- Encouraging the use of less pollutant energy e.g. Hydro electricity and bio-gas to reduce demand for wood fuel and charcoal.
- Planting greenbelts to improve on the climate of the towns e.g. lowering heat levels.
- Filling in pits and depressions after quarrying to destroy breeding grounds for mosquitoes.
- Mass sensitization of people in the city about environmental conservation.
- Setting strict laws to ensure urban hygiene e.g. heavy fines for dropping litter and rubbish anyhow.
- Using alternative building materials to reduce demand for timber e.g. glass and metal.

END

TOPICS COVERED	MINING
CLIMATE	FISHING
VEGETATION	TRANSPORT
FORESTRY	TRADE
POPULATION	INDUSTRIALISATION
TOURISM	ENERGY
AGRICULTURE	URBANISATION