



Dr. Blosa Science

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The Science Foundation College
Uganda East Africa
Senior one to senior six
+256 778 633 682, 753 802709
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Geography (UACE 250/2) paper 2 revision questions for Forestry in the world

1. Account for the development of the forestry industry in either Brazil or Canada (25marks)

Candidate is expected to define a forest or forestry

- Justify the types forest and characteristics
- Type of tree species /types of trees
- Name areas covered by forests and forest/fiber collecting centres
- Then account for the development of forest industry

BRAZIL

- The forests in this country are Equatorial characterized by hard wood species and they are evergreen with buttress roots.
- Types of tree species include Mahogany, Ebony, Okoume, Teak, Rosewood, Green heart
- The forests are found along the Amazon river and her tributaries and extends from the Atlantic Coast to the foot hills of the des mountains (Belohorizante, Sao Paul, St Louise, Brasilia etc.)

CANADA

The forestry industry is more developed in the province of British Columbia in the western Coastal ranges.

The forests are coniferous /temperate with the following characteristics:

- Trees appear in pure stands
- Trees are Evergreen with needle-like leaves
- The trees are tall, light and yield soft wood main species include: Douglas, fir, spruce, pines, Western hemlock, etc.
- Timber collecting export centres are Prince Rupert port, Port Victoria and Vancouver

Factors are more or less similar

Factors that have favored development of the forestry industry in Canada

- The cool temperate climate of cold temperatures up to 20°C and adequate rainfall above 1000 mm p.a favors the growth of a variety of coniferous trees such as Douglas fir, Western

Hemlock, Red cedar, Spruce which yield timber of commercial value and highly demanded on the world market.

- The poor soils of the Laurentian shield region in the East discourages agriculture but favors the growth of Balsam fir, Red spruce, Lodge pole pines. While in the western British Columbia is relatively fertile soils supports Douglas fir, Western Hemlock, Spruce and Cedar.
- In the west, British Columbia consists of a rugged terrain (landscape) makeup of the Coastal ranges and Rockies Mountains. In the East, there is the Laurentian highland. These limit settlements and agriculture hence forestry is the only viable economic activity practiced in these regions.
- The generally high altitude in British Columbia in the west of Canada limits settlement but is favourable for the growth of coniferous forests particularly on the Rocky Mountain, Coastal ranges and Vancouver Island.
- Existence of many rivers that are used for transportation of logs to the saw mills and factories at a relatively cheaper cost for export or processing into other products. Examples are River Fraser, R. Mackenzie, R. Skeena, R. Columbia, R. Athabasca, Gold River on Muchalet inlet etc.
- The abundant rivers in British Columbia (western Canada) such as R. Fraser, R. Columbia have been dammed to generate HEP. This has facilitated development of timber processing and pulp and paper industry at Vancouver and Fraser valley at Prince George, Albemarle. In the East, HEP is got from River Sagueny along the St Lawrence Seaway. This is used in the pulp and paper industries at Quebec.
- The numerous rivers such as Fraser, Columbia in British Columbia (West Canada) and Sagueny river in the East supply clear unpolluted water for soaking and bleaching the pulp (paper) at Ottawa, Quebec, Montreal and other industrial centres.
- Canada has a variety of valuable tree species. Examples are spruce trees which are used for pulp and paper, Douglas fir, suitable for sawn wood for production of furniture & pre-fabricated building timber. Other species are Red cedar, western Hemlock, Pines etc. This has favored sustainability of the forestry industry.
- Canada has a small population of about 30 million people most of who live in the South along the Great lakes region. This has left the northern region with very low and sparse population hence favoring development of forestry activities.
- During winter the ground surface is frozen or covered by snow, logs can then be easily transported by dragging them along the rather slippery ground at a relatively cheaper cost. During spring the logs are then floated down stream when the rivers thaws and are filled with melt water.
- Application of modern technology to extract trees. This includes use of tractors to cut and load logs/trees onto trucks chain saws, power driven saws to chop logs into smaller pieces, use of a steel tower as a Spar from which the logs are picked and then lowered and loaded either on the ground Or directly on transportation trucks have made work more faster and efficient
- Ready market for the Canadian timbers, pulp and Newsprint is provided by the North Eastern USA where there is a big print and publishing industry, the Britain, Japan, China, India where spruce pulp is used to make Rayon(Textiles) has made the forestry industry economically important
- Trees generally appear in pure stands of a single species of say spruce, or Hemlock over a very wide area. This makes selection and cutting of trees very easy thus encouraging large scale exploitation for commercial purposes.

- Availability of an abundant experienced labour force working in the forestry industry to select, fell and chop trees into logs. Labour is provided by Native tribes such as Algonquin, Cree, Inuit and migrant labor from USA, France and Norway.
 - Availability of capital got from oil revenue and loans from Banks such as HSBC Bank, Citigroup bank to invest in basing logging such as tractors, steel towers, and timber machinery.
 - Influence of both foreign and local investors with abundant capital and knowledge in the forestry industry has led to massive investment in the sector.
 - Presence of a well-developed transport Network by road, railway that link the East to West coast facilitates transportation of logs and timber products to processing factories in Vancouver, Ottawa, Quebec and Montreal
 - Canada is a politically stable country. This has favored long term investment in the forestry industry involving setting up of pulp and paper industries at Vancouver, New Westminster, and Nelson lumbering centre on R. Columbia etc.
 - Favorable government policy which emphasizes afforestation, re-afforestation, attraction of foreign investors, allocation of land to processing factories, monitoring of forests to control fire outbreak and misuse, licensing of competent lumbering companies have encouraged management of the forestry industry on a sustainable basis.
 - Intensive research to develop the forestry industry. For example research is done to establish causes of fire outbreaks, invention of chemicals that are used to extinguish the fire outbreak, disease and pest control methods have led to development of forestry.
2. (a) Account for the rapid destruction of forests in **either** the Congo Basin or the amazon Basin(15 marks)

(The candidates are expected to select one region and give reasons for the rapid destruction of forests)

The reasons for the destruction of the forests are more or less similar.

- The Congo basin is comprised of countries like Gabon, DRC, Congo republic, etc.
- The Amazon basin is comprised of countries like Brazil, Bolivia, Colombia, Ecuador, etc.
- The regions have tropical rainforests, Equatorial rain forests, evergreen, hardwood, broad leaves, etc.

The reasons for rapid forest destruction include the following:

- There is increased demand for fuel wood and charcoal
- The increasing population used part of the forest area for settlement
- The mining and quarrying destroy forest cover.
- There is increasing need for agricultural land
- The creation and extension of urban centres/ urbanization
- The construction of transport routes i.e. railways, roads, etc. destroy forests
- The poor government policies e.g. degazetting forests, failure to restrict exploitation and destruction
- The influence of pests and diseases
- Political instability
- Improved technology by manufacturing industries for forest products to be used as raw

materials

- High demand for forest products such as herbs , fruits, roots have led to rapid clearance of forests
- Wild fires
- Destruction by wild animals.

(b) Explain the effects of deforestation on the environment in the area chosen in (a) above. (10 marks)

Candidates are expected to be consistent with the area in (a) and explain the effects of deforestation on the environment

The effects are more or less similar. They include the following:

- Destruction has led to changes in climate in the area e.g. decline in rainfall
 - Removal of vegetation results into problems of soil erosion.
 - Rapid loss of soil fertility due to loss of humus which affects crop production. Lowering of water table that is reflected in loss of surface water.
 - Leads to siltation of river channels due to the excessive run off.
 - It increases pollution especially of air and reduction in purification due to loss of carbon absorbers.
 - Loss of valuable tree species e.g. for medicine, timber/loss of animals and birds.
 - Destruction of natural habitats for wild animals leading to migrations
 - Shortage of wood fuel and charcoal leading to energy crisis.
 - Causes reduction in government revenue and foreign exchange.
 - Displacement of the communities which depend much on the forests for their livelihood.
 - Leads to unemployment
 - The flooding of rivers destroys lives and property
 - It contributes to landslides and its negative effects
 - It has created energy crisis/ scarcity of fuel
 - Lack of wind breaks contribute to the destruction caused by wind storms
 - There is displacement of the indigenous forest communities
 - Loss of revenue / decline in export/ industrial earnings.
3. Explain the problems faced in the exploitation of tropical rain forests in either Gabon or Brazil. (25 marks)

*Candidates should identify **the tropical forest**; they should select one country either Gabon or Brazil and then explain the problems faced in the exploitation of the forests.*

Solution

The tropical forests are forests located between 0 – 10⁰N or 0 – 10⁰S of the equator, with major species such as Mahogany; ebony, teak, long wood, green heart, iron wood, azobe, ozigo etc.

- *They are equatorial forests.*
- *They yield hardwoods.*

Factors that limit exploitation of tropical forests

Physical factors

- Most of the commercial tree species are bulky & heavy hence difficult to transport. This has limited the number of trees exploited. Examples are Omo, Okoume, Azobe, Maobi in Gabon.
- Most of the trees yield hardwood. For example Mahogany, Ebony, Ironwood and red heart. These have limited market on the international market because their purpose is mostly limited for furniture purposes other than a variety of uses such as pulp and paper, Newsprint etc.
- Tropical hard wood tree species such as Azobe, Okoume, teak, Ebony in Gabon have huge trunks and buttress roots that make felling of trees difficult. A platform has to be constructed around the trunk before felling of trees difficult. This takes a lot of time.
- The hilly Terrain (mountainous nature) in some countries such as Gabon, Brazilian highlands makes felling and transportation of logs difficult making it difficult to exploit tropical rainforests
- Commercial tree species e.g. mahogany and the inferior tree species are highly intermixed (Absence of pure stands). This makes the process of selecting trees to be cut down time wasting and extraction difficult because they have to be careful such that the falling trees don't hit or knock out the others.
- Tropical hardwood species such as ebony, Red heart, mahogany take a long period of time to grow (mature). This may be 60 – 100 years to yield valuable timber. This affects the lumbering companies.
- Thick undergrowth in tropical forests makes felling, selection and transportation of trees / logs difficult.
- The rope-like climbing plants such as lianas make felling difficult They tend to hold back the cut trees thus many other trees have to be cleared in order to bring down the cut wood.
- Presence of fierce wild animals e.g. leopards, reptiles like pythons (anaconda) in Brazil, biting insects such as bees, wasps, red ants, black ants limits exploitation of tropical forests in Amazon (Brazil), Gabon.
- The tropical climate of hot wet and humid weather affects exploitation of tropical forests in Brazil, Gabon. For example it almost rains every day in the Congo forests hence felling of trees is halted.

Other factors

- There is limited skilled labour to exploit tropical forests in Gabon, Brazil, DR. Congo. Labour at times fails to identify the tree species of commercial value.
- Limited capital to purchase the necessary logging equipment such as tractors, chain saws, diesel saws makes exploitation difficult in Gabon, Brazil etc.
- Inaccessibility due to limited communication lines in most tropical forests such as the Amazon in Brazil, Gabon forest makes exploitation of tropical forests difficult.
- Competition from other countries that produce valuable soft wood such as Norway, Switzerland, Canada, Finland affect exploitation of tropical forests.
- Local demand for charcoal and firewood makes exploitation of tropical forests difficult.

Much of the forests are cut down for energy purposes.

- Low levels of technology characterized by use of band axes, hand driven saws in Gabon, Brazil make felling of trees difficult
- Political instabilities in Gabon and neighboring countries limit exploitation of tropical forests. These forests are used as hiding places by rebels.
- Competition from other sectors of the economy affects exploitation tropical forests. For example in Brazil exploitation of forests is competing with iron ore mining at Serra dos Carajas, gold mining at Serra Palada. In Gabon oil mining competes with forestry.
- Bush fires started by bunters, for example the Seringueiros and Ribeirinhos indigenous tribes in Amazon (Brazil) set the forest ablaze hence destroying valuable tree species.
- Limited electricity to process timber limits exploitation of tropical forests for example in

Gabon.

- Limited local market for forestry products in tropical countries such as Gabon, limits exploitation of tropical forests.
 - Environmental conservative organizations tend to advocate against lumbering/cutting down forests. This limits exploitation of tropical forests in Gabon. Brazil.
 - Limited research to identify commercial tree species , controlled lumbering, replanting of the forests, market have affected forest exploitation.
 - Occurrence of accidents during the process of lumbering / felling of trees has often resulted into loss of lives. Hence discourage lumbering.
 - Massive deforestation for either agricultural, settlement, mining or establishment of HEP there have reduced the amount of forests available for lumbering activities
 - Increase in population (population pressure) has led to encroachment.
4. To what extent have human factors influenced the exploitation of Equatorial forests in **either** Brazil **or** the Democratic Republic of Congo? (25 marks)

The candidate is expected to explain the human factors that influence the exploitation of equatorial forests in either Brazil or DRC vis-a-vis other factors i.e. physical conditions.

NB *The factors influence the exploitation forests either through favoring or through limiting of their exploitation.*

A good candidate is therefore expected to opt for either factor that favor or those that limit exploitation of equatorial forests in one of the countries and remain consistent. The factors are more or less similar.

Solution

- The Equatorial forest / hard wood/ rain forests in Brazil are found in the Amazon River basin.
- In DRC the forests are found in the Zaire/ Congo River basin.
- The species found in these forest include, Mahogany, Okoume. Green heart, Logwood etc.

The factors that have influenced the exploitation of Equatorial forests include the following

EITHER: Factors that limit exploitation of tropical forests

Physical factors.

- Most of the commercial tree species are bulky and heavy hence difficult to transport. This has limited the number of trees exploited. Examples are Ebony, Mahogany, Iroko and Idigbo.
- Most of the trees yield hardwood for example Mahogany, Ebony, Ironwood and red heart. These have limited market on the international market because their purpose is mostly limited for furniture purposes, other than a variety of uses such as pulp and paper, Newsprint etc.
- Commercial tree species e.g. mahogany and the inferior tree species are highly intermixed (Absence of pure stands). Thus makes the process of selecting trees to be cut down time wasting and extraction difficult because they, have to be careful such that the falling trees don't hit or knock out the others.
- Presence of fierce wild animal e.g. leopards, reptiles like pythons (anaconda) in Brazil, biting insects such as bees, wasps, red and, black ants limits exploitation of tropical forests in DR. Congo.
- Tropical hard wood tree species such as teak, Ebony in DR. Congo have huge trunks and buttress roots that make felling of trees difficult. A platform has to be constructed around the trunk before felling can start. This takes a lot of time.
- The Hilly Terrain (mountainous nature) of some countries such as East DR. Congo or Brazilian highlands makes felling and transportation of logs difficult making it difficult to exploit tropical rainforest,.
- Tropical hardwood species such as ebony, Red heart, mahogany take a long period of time to grow (mature). This may be 60 – 100years to yield valuable timber. This affects the lumbering companies.
- Thick undergrowth in tropical forests makes felling, selection and transportation of trees / logs difficult. The rope-like climbing plants such as lianas make felling difficult. They tend to hold back the cut trees thus many other trees have to be cleared in order to bring down the cut wood.
- The tropical climate of hot, wet and humid weather affects exploitation of tropical forests in Brazil or DR. Congo etc. For example it almost rains every day in the Congo forests hence felling of trees is baited.

Human factors

- There is limited skilled labour to exploit tropical forests in Brazil or DR. Congo. Labour at times fails to identify the tree species of commercial value.
- Limited capital to purchase the necessary logging equipment such as tractors, chain saws, diesel saws makes exploitation difficult in DR. Congo or Brazil.
- Inaccessibility due to limited communication lines in most tropical forests such as the Amazon in Brazil or DR. Congo making exploitation of tropical forests difficult.

- Competition from other countries that produce valuable soft wood such as Norway, Switzerland, Canada, Finland affect exploitation of tropical forests.
- Local demand for charcoal and firewood makes exploitation of tropical forests difficult. Much of the forests cut down for energy purposes.
- Low levels of technology characterized by use of hand axes, hand driven saws in DR. Congo or Brazil make felling of trees difficult.
- Political instabilities in DR. Congo or Brazil limit exploitation of tropical forests. Forests are hiding places for rebels.
- Competition from other sectors of the economy affects exploitation tropical forests. For example in Brazil exploitation of forests is competing with iron ore mining at Serra dos Carajas, gold mining at Serra Palada. In Dr. Congo mineral mining competes with forestry.
- Bush fires started by hunters, farmers for example the Seringuciros and Ribcuinhos indigenous tribes in Amazon (Brazil) set the forest ablaze hence destroying valuable tree species.
- Limited electricity to process timber limits exploitation of tropical forests for example in DR. Congo.
- Limited local market for forestry products in tropical countries such as Dr. Congo limits exploitation of tropical forests.
- Environmental conservative organizations tend to advocate against lumbering / cutting down of forests. This limits exploitation of tropical forests in Dr. Congo.
- Limited research to identify commercial tree species, controlled lumbering, replanting of the forests, market research have affected forest exploitation.
- Occurrence of accidents during the process of lumbering/ felling of trees has often resulted into loss of lives. Hence discourage lumbering.
- Massive deforestation for either agricultural, settlement, mining or establishment of HEP have reduced the amount of forests available for lumbering activities especially in Cameroon, Ivory coast, Nigeria etc.

OR:

Factors favoring exploitation of tropical rain forests

Physical factors

- Equatorial climate characterized by hot temperature above 24°C and wet conditions (rainfall totals of over 1500mm p.a) favors quick growth of luxuriant forests. The relatively low altitude below 500metres above sea level and generally gentle slopes favors growth, felling and transportation of tree logs.
- Deeply weathered fertile soils in much of Brazil particularly in the Amazon basin favors quick growth of luxuriant growth of forests. Such forests require abundant nutrients from the soil to support their enormous size and height.
- Existence of numerous rivers favors floating and transportation of logs Examples are River Amazon, River Madeira. R. Pamaiba, R. Xingu etc.
- Abundant Energy requirements for processing of logs into timber is readily available from

various HEP stations such as Tucuri dam, Altamira dam, Santanem dam, Balbina dam, Pamoba dam etc.

- Presence of vast areas with limited human settlement or agricultural activities where forests grow. The Amazon forest covers most parts of Brazil because these are virgin lands with limited human interference. Existence of a variety of valuable tree species such as Ebony, Mahogany, teak yield highly demanded timber on the world market
- Existence of a variety of favorable tree species such as Ebony, Mahogany, teak which yield highly demanded timber on the world market.

Human factors

- Presence of both skilled and semi-skilled labour to handle forestry activities for example multi-National corporations from Canada, Norway, and Germany have skilled labour that select, fell commercial tree species while the semi-skilled labour, does loading of logs.
- Sparse population in that much of the Brazilian population lives in cities. Actually 82% of people live in cities particularly on the coast in the south and South East. This leaves a big proportion of land free for forestry activities.
- Relative political stability due to multi-party democracy has enabled long term investment in the forestry industry through establishing processing facilities, attraction of foreign investors with huge capital to invest in the forestry industry.
- Application of modern technology like felling tractors to extract forest resources ensures efficiency and a fast process. Tractors, diesel saws, chain saws are all applied in felling of trees.
- Intensive research involving cutting of trees in patches to ensure sustainability, invention of new pharmaceutical plants and food stuffs all favor the forestry industry.
- Favourable government policy e.g. afforestation and re-afforestation programs for example at Carajas favors sustainability, attraction of foreign investors from Canada, Norway, China to invest in the forestry industry.
- Presence of capital to invest in the Industry by establishing processing facilities, establishment of ports that handle forestry resources. Such capital is got from Bank such as the Citigroup bank, HSBC Bank and World Bank. Receipts from mineral exports is also invested in the forestry sector
- With a local population of 186 million people there is adequate local market for forest products such as timber, furniture etc. Much is also exported to China and Japan to acquire foreign exchange used for development
- Existence of developed transport network for example the perimeter highway in the north, the Trans- Amazonian highway (5300km) stretches from the east to west of the country, favoring exploitation of the forestry resources. R. Amazon which rises as a spring in the Peruvian Andes and flows for 6290km to its delta mouth where the river is over 300km wide amazing. Is also very important for transporting of timber by even ocean liners.
- Presence of developed coastal ports to process and handle forestry products. Examples are Belem, Sao Louis, Oiapoque: Recife, Joao Pessoa have favored the forestry industry in Brazil.
- Existence of several industries that process logs into several aspects. These include

furniture, timber, and pulp and paper industries.

5. (a) Describe the characteristics of tropical rain forests. (10 marks)

(Candidates should identify tropical rainforests as forests and then give their characteristics)

Tropical rainforests are forests located in the tropical region $0^{\circ} - 10^{\circ}$ north or south of the equator.

Characteristics of tropical rainforest

- They are evergreen forests.
- They have broad leaves so as to get rid of water.
- The trees have buttress roots to give the trees extra support.
- The trees are tall and straight on average 50m as they struggle for light.
- The trees exist in pure stands i.e. they are highly mixed in many different species of up to 100 or more species some colonies.
- The trees yield hard wood e.g. green heart, ebony, mahogany, rosewood, muvule etc.
- Trees have huge trunks which are heavy.
- Forests develop three layers of canopy. There is a wildering mixture with climbers, creepers e.g. epiphytes, parasitic plants.
- The trees are umbrella shaped, they have bushy spreading tops.
- Some trees bear fruits.
- Limited or no growth.

- (b) Explain the factors which have favored the commercial exploitation of tropical rain forests in **either** Brazil **or** Gabon. (15 marks)

(Candidates should choose one country and explain the factors which influence the development of commercial exploitation of tropical forests.

Factors favoring exploitation of tropical rain forests in Brazil

Physical factors favoring exploitation of tropical rain forests in Brazil

- Equatorial climate characterized by hot temperature above 24°C and wet conditions (rainfall totals of over 1500mm p.a) favors quick growth of luxuriant forests. The relatively low altitude below 500metres above sea level and generally gentle slopes favors growth, felling and transportation of tree logs.
- Deeply weathered fertile soils in much of Brazil particularly in the Amazon basin favors quick growth of luxuriant growth of forests. Such forests require abundant nutrients from the soil to support their enormous size and height.
- Existence of numerous rivers favors floating and transportation of logs Examples are River Amazon, River Madeira. R. Pamaiba, R. Xingu etc.
- Abundant Energy requirements for processing of logs into timber is readily available from various HEP stations such as Tucuri dam, Altamira dam, Santanem dam, Balbina dam,

Pamoba dam etc.

- Presence of vast areas with limited human settlement or agricultural activities where forests grow. The Amazon forest covers most parts of Brazil because these are virgin lands with limited human interference. Existence of a variety of valuable tree species such as Ebony, Mahogany, teak yield highly demanded timber on the world market
- Existence of a variety of favorable tree species such as Ebony, Mahogany, teak which yield highly demanded timber on the world market.

Human factors

- Presence of both skilled and semi-skilled labour to handle forestry activities for example multi-National corporations from Canada, Norway, and Germany have skilled labour that select, fell commercial tree species while the semi-skilled labour, does loading of logs.
- Sparse population in that much of the Brazilian population lives in cities. Actually 82% of people live in cities particularly on the coast in the south and South East. This leaves a big proportion of land free for forestry activities.
- Relative political stability due to multi-party democracy has enabled long term investment in the forestry industry through establishing processing facilities, attraction of foreign investors with huge capital to invest in the forestry industry.
- Application of modern technology like felling tractors to extract forest resources ensures efficiency and a fast process. Tractors, diesel saws, chain saws are all applied in felling of trees.
- Intensive research involving cutting of trees in patches to ensure sustainability, invention of new pharmaceutical plants and food stuffs all favor the forestry industry.
- Favourable government policy e.g. afforestation and re-afforestation programs for example at Carajas favors sustainability, attraction of foreign investors from Canada, Norway, China to invest in the forestry industry.
- Presence of capital to invest in the Industry by establishing processing facilities, establishment of ports that handle forestry resources. Such capital is got from Bank such as the Citigroup bank, HSBC Baal and World Bank. Receipts from mineral exports is also invested in the forestry sector
- With a local population of 186 million people there is adequate local market for forest products such as timber, furniture etc. Much is also exported to China and Japan to acquire foreign exchange used for development
- Existence of developed transport network for example the perimeter highway in the north, the Trans- Amazonian highway (5300km) stretches from the east to west of the country, favoring exploitation of the forestry resources. R. Amazon which rises as a spring in the Peruvian Andes and flows for 6290km to its delta mouth where the river is over 300km wide amazing. Is also very important for transporting of timber by even ocean liners.
- Presence of developed coastal ports to process and handle forestry products. Examples are Belem, Sao Louis, Oiapoque: Recife, Joao Pessoa have favored the forestry industry in Brazil.
- Existence of several industries that process logs into several aspects. These include furniture, timber, and pulp and paper industries.

Factors favoring exploitation of tropical rain forests in Gabon

- . Latitudinal location astride the equator characterized by hot temperature (24°C) and heavy and well distributed rainfall (1500 -2000 mm p .a.) throughout the year favors quick growth of the forests in much of Gabon.
- Existence of the fairly low altitude below 1000 metres above sea level also favors the growth of tropical lowland forests with huge and tall trees.
- Existence of a variety of unique and valuable tree species suitable for manufacturing of high quality plywood and veneers e.g. Okoume,, Azobe and Ozigo, Ebony, Mahogany have led to massive investment in the forestry sector by both local and foreign investors.
- Existence of a variety of navigable Rivers such as R Ogooue facilitates transportation of logs to the coast for processing and exports at a relatively low cost.
- Developed coastal ports such as Port Gentil with processes facilities that process forestry products into other commodities, stores and handle timber exports destined for China, Japan, France etc.
- .Availability of abundant HEP generated from R. Ogooue is used to process forestry products into timber, ply wood, veneers, furniture and other products.
- The sparse population especially in the interior ensures adequate land where forests grow without human interference for settlement and agriculture.
- Existence of both skilled and semi-skilled labour to carry out the lumbering operations such as felling, logging, transportation, loading, marketing etc.
- Large sums of capital from banks and local savings were invested in the forestry industry by both local, foreign investor and the state. Such capital was used to purchase machinery, pay labour, construct ware houses etc.
- Ready market for timber in China, Japan, and France has ensured sustainability of the forestry industry because whatever is exploited is bought and the revenue re-invested in the forestry product
- Developed transport network in form of roads, railways e.g. Trans -Gabonais railway that link the coast to the interior forest such as that at Toucan site, Ivindo National park forests facilitates transportation of forest products to market centres.
- Modern technology e.g. tractors to cut and load logs onto trucks, chain saws to cut trees, logging arches, diesel saws facilitates quick and efficient logging enabling commercial exploitation leading to development of the forestry industry.
- Relative political stability and security provided by the police and armed forces has led to massive investment in forestry by both the government and-foreign investors from France, China, Malaysia through building timber processing facilities etc.
- Supportive government policy involving re-forestation, afforestation, controlled lumbering, allocation of land for establishment of processing facilities, offering lumbering licenses after scrutiny have favored development of the forestry industry.
- Existence of several timber processing factories in form of sawmills at Kango, port Owendo and Lambarene have favored the forestry industry through providing market to timber

exploited from forest, processing of timber into various products like plywood, veneers, pulp and paper.

- Rugged relief/ steep slopes that limit settlement and agriculture in certain areas hence favoring growth of forests.

6. (a) Distinguish between boreal forests and tropical rain forests.

Boreal forest	Tropical forest
Locates in high latitudes or temperate land	Located in tropical or equatorial area
Dominated by soft or light wood e.g. conifers, firs, spruces	Dominated by hard or heavy woods e.g. mahogany, teak, rosewood, ebony etc.
Trees grow in pure stands	Trees grow in impure stands (valuable trees are scattered.)
No creepers and climbing e.g. lianas, epiphytes	Presence of creepers and climbing plants
Have needle shaped leaves	Have broad shaped leaves
Have shallow roots	Have buttress roots
The trees are conical shaped and one layer	Trees are umbrella shaped with e canopies/layers/tier
Have medium sized stems	Very tall trees
They are located in high altitude	They are located in low altitude
Few tree species	Many tree species
Waxed leaves	Not waxed leaves
produce cones	Produce fruits

(b) Explain the factors which have favored the growth of tropical rainforests **in either** Brazil **or** the Democratic Republic of Congo (DRC).

The factors are more or less the same

- Fertile soils that promote growth of trees
- Suitable climate hot and rainy throughout the year
- Altitude favors the growth of various types of tropical rain forests. Areas of less than 2000 metres above sea level favors the growth of Tropical Lowland forests such as the Congo forests, areas of a high altitude above 2500m also favors the growth of Tropical highland forests also called Montane forests. These are found on high mountains such as Rwenzori in the east of DR. Congo or Brazilian highlands in the east of Brazil.
- Drainage factors. Tropical rain forests grow in well drained areas. Riverine forests particularly grow along the courses of major rivers such as river Congo, R. Amazon. Both the Congo and Amazon forests are found in areas of numerous rivers. These supply water required for growth of those forests.
- The presence of pests and diseases such as Tsetse flies which transmit sleeping sickness in the Congo and Amazon forests; the presence of fierce wild animals such as Leopards acts as deterrents that stop from encroaching upon these forests hence favoring their existence.
- Sparse or low population favors the growth of the Tropical rain forests such as the Amazon and Congo forests.
- Governmen1 policy of forest conservation in Brazil, DR. Congo has favored the growth of tropical rain forests.

- Mountainous nature along Tropical highland forests (Montane) such as along the Mt. Rwenzori in eastern DR. Congo, Brazilian highlands in the E.st of Brazil limits mobility and exploitation hence favors growth of these forests.
- Poor technology such as hand axes characterized by most of the countries where Tropical rainforests are located favors their growth. Few trees can be cut down with such poor tools.
- Inaccessibility due to remoteness and poor transport within Tropical rainforests such as the Amazon forests in Brazil, Congo basin forests in DR. Congo favors the growth of these forests simply because such factors limits exploitation.
- Limited market for forestry products in the DR. Congo, Amazon basin favors the growth of Tropical rainforests.
- Nature of trees in tropical rain forests limits exploitation hence favors their growth. For example mahogany and ebony have a buttress root system which makes felling difficult.
- They have climbing plants that twist from tree to tree. This makes felling of the tree cut down not obvious.

7. (a) Account for the destruction of forests in Africa (15 marks)

The reasons for rapid forest destruction include the following:

- There is increased demand for fuel wood and charcoal
- The increasing population used part of the forest area for settlement
- The mining and quarrying destroy forest cover.
- There is increasing need for agricultural land
- Fire outbreak
- The creation and extension of urban centres/ urbanization
- The construction of transport routes i.e. railways, roads, etc. destroy forests
- The poor government policies e.g. degazetting forests, failure to restrict exploitation and destruction
- The influence of pests and diseases
- Political instability .
- Improved technology by manufacturing industries for forest products to be used as raw materials
- High demand for forest products such as herbs, fruits, roots have led to rapid clearance of forests.
- Excessive lumbering for exportation.
- Destruction by wild animals.

(b) Outline the effects of deforestation in the environment in Tropical Africa (10marks)

The effects are more or less similar. They include the following:

- Destruction has led to changes in climate in the area e.g. decline in rainfall
- Removal of vegetation results into problems of soil erosion.

- Rapid loss of soil fertility due to loss of humus which affects crop production. Lowering of water table that is reflected in loss of surface water.
- Leads to siltation of river channels due to the excessive run off.
- It increases pollution especially of air and reduction in purification due to loss of carbon absorbers.
- Loss of valuable tree species e.g. for medicine, timber/loss of animals and birds.
- Destruction of natural habitats for wild animals leading to migrations
- Shortage of wood fuel and charcoal leading to energy crisis.
- Causes reduction in government revenue and foreign exchange.
- Displacement of the communities which depend much on the forests for their livelihood.
- Leads to unemployment
- The flooding of rivers destroys lives and property
- It contributes to landslides and its negative effects
- It has created energy crisis/ scarcity of fuel
- Lack of wind breakers contribute to the destruction caused by wind storms
- There is displacement of the indigenous forest communities
- Loss of revenue / decline in export/ industrial earnings.
- Lowering of water table
- Causes aridity and desertification

8. (a) Describe the characteristics of temperate forests.

- Trees exist in pure stands
- Trees are predominantly soft wood e.g. spruce, pine, Hemlock, Douglas fir, maple, redwood.
- They are evergreen throughout the year
- Trees have needle shaped leaves to reduce transpiration
- The barks and leaves are covered by wax.
- Trees have thin tall straight stems
- Trees have conical shape
- Trees mature in a short period
- Trees produce cones instead of fruits
- Trees produce light wood
- Trees lack prominent under growth
- Trees have thin shallow lateral roots

(b) To what extent have human factors favored the development of forestry industry in either Finland or British Colombian in Canada?

(Candidates should explain how human factors have favored the development of the forestry industries in either Finland or British Colombia)

Factors favoring forestry in Finland

- Human factors favoring forestry in Finland
- Abundant skilled labour to select, cut, transport and process forest resources into different products such as furniture.
- Modern technology such as tractors, chain saw etc. facilitate processing of forest products easily
- Presence of ready market for wood and forest products both locally and internationally.
- Supportive government policies that encourage foreign investment, afforestation, re-forestation etc.
- Developed transport network to facilitate transport of timber to factories and wood products to the market.
- Presence of many timber industries to process timber furniture pulp etc.

Other factors

- Cool temperatures where almost half of the year the country is covered by snow and ample rainfall that favor growth of coniferous forests.
- The poor moraine soils in much of the country are too hard for agriculture but can support growth of forests.
- Availability of forests to support large scale investment in forestry.
- Presence of rivers to provide HEP to provide energy to process furniture
- Availability of water for soaking and bleaching pulp
- Snow during winter favors log transport
- Occurrence of commercial pure stand as scots pine spruce, birch trees etc.

Thank you
Dr. Bbosa Science