**TRANSPORT**

Transport is the physical movement of people or commodities from one place to another. The level of development of transport and communication network is usually a reflection of the level of economic development in any given region.

Accessibility is the ease of reaching a desired destination. Mobility in the transport context is the ability of individuals to move about.

**Role of transport in economic development**

1. ***Transport opens up new markets for produce*** such as highways, feeder roads. This promotes agricultural development by lowering costs, saving time, extending extension services, and opening up the formerly unproductive areas. In order to develop economically, countries must able to export their produce.
2. ***Promotion of industrialization*** by encouraging investors and therefore increases capital inflow, influences industrial location and distribution. This is due to easy movement of raw materials to the industries and movement of finished goods to markets.
3. ***Allows regions to specialize in the production of commodities*** where they have comparative advantage. This creates effective demand and supply relationships. The goods are easily transferred from areas of production to areas of market.
4. ***Joining areas of surplus and deficit***. The export and distribution of commodities leads to sustainable development of economies and minimizing scarcity of commodities. This in turn controls the rate of inflation.
5. ***Promoting local, regional, and international trade*** and this leads to interstate cooperation and unity. This is because the agricultural products, industrial products are easily transferred from areas of production to marketing centres. This in turn increases national income.
6. ***Encouraging spread of ideas leading to cultural, economic, social, and political transformations.*** Transport enables diffusion of ideas such as on science and technology leading to innovation and invention in the countryside. This in turn supports various economic activities like agriculture, and trade.
7. ***Promotion of tourism development*** such as in Republic of South Africa, Switzerland, Mexico, Kenya, and USA. This makes the tourist areas easily accessible/ facilitates easy movement of tourists to various tourist potentials. This eventually increases foreign currency which is invested in various sectors like education, and health.
8. ***Generation of many employment opportunities***, associated with all transport systems and networks. Many people are employed as engineers, pilots/ drivers, cargo managers, and accountants. These earn salaries and wages which they use to improve their standards of living in areas of health , housing, and recreation.
9. ***Enhancing political control, national unity and efficient administration***. This is because the government bodies like ministerial head quarters and police are easily set up in various parts of the country. It also promotes political stability due to easy monitoring of various parts of the country and this is associated with balanced regional development.
10. ***Promoting urbanization/ growth of urban centres***. There is a relationship between transport and settlement especially urban and coastal areas, depending on the trend it takes. Therefore transport increases population concentration in many areas such as towns and this results into expansion of urban activities like trade and commerce, banking, insurance, ware housing, and entertainment.
11. ***Generation of government revenue*** through taxation of the sectors using the transport systems such as agriculture, tourism, banking, and industry. The government revenue is to meet the government budget, hence financing more infrastructural development.
12. ***Promotion of economic diversification***  because of the diversified forms of transport such as road, railway, water and air. The transport systems uplift various economic sectors like tourism, mining and industry. This in turn widens the gross domestic product (GDP) and the export base of the country.

**Negative effects/short comings**

1. ***Transport is associated with accidents*** which are disastrous to lives of people and property. This is noted with railway, road, water and air transport such as crashing of planes, capsizing of vessels, collusion of vehicles.
2. ***It is associated with traffic congestion*** causing unwanted delays in the delivery of goods and services, and thus undermining the development process.
3. ***Results in high rates of environmental pollution***, that is, air, water and noise pollution. The emitted fumes from automobiles are dangerous to the life forms of the environment like it causes respiratory diseases.
4. ***Results into destruction of vegetation*** such to construct roads, railways, and airports. This results into soil erosion and land degradation due to reduced soil stability on the road/ railway sides.
5. ***Transport is associated with increased crime rates, wherever they occur***. For example there is highway robbery on the Trans-African highway in particular sections like valley areas, and forested zones; railway station theft and of recent world terrorism evident in air transport.
6. ***High costs of construction and maintenance of the networks*** such as port facilities, railway lines, roads etc. In turn, there is increased government expenditure on the maintenance of such networks, hence straining the government budget.
7. ***Over exploitation of environmental / natural resources leading to quick depletion***. This is through increased accessibility to various resources such as mineral resources, forest resources- working against the future generations.
8. ***Results urban-related problems*** such as congestion/ overcrowding, and slum growth. The eradication of such problems is very costly to the government.
9. ***Leads to regional imbalance in development***. Easily accessible areas are more developed in terms of infrastructure than other areas, leading to income inequalities.
10. ***Results in rural-urban migration*** which has disastrous impacts on both the source areas (rural) and receiving areas (urban). For example decline in crop cultivation in the rural areas yet there are urban problems created (like slums).
11. ***Displacement of many people during transport development***. As transport routes are being constructed or expanded, many people are displaced from their settlement and production areas with little or no compensation. There is also a problem of resettlement of the displaced people.

**Guiding questions**

1. Explain the role of railway transport in the development of either Switzerland or the republic of South Africa.
2. Examine the contribution the transport sector to the development of either USA or Egypt.

**FACTORS LIMITING THE EFFECTIVE UTILIZATION INLAND WATER TRANSPORT IN AFRICA**

Inland water transport in Africa involves the use of rivers and lakes. Rivers include: Congo River, Niger River, Nile River, Volta River, Zambezi River, Senegal River, among others. The lakes include: Victoria, Tanganyika, Malawi, Kyoga, Chad etc. The factors/problems limiting the effective utilization of inland water transport in Africa include:

1. **Presence of waterfalls, rapids and gorges along the courses of rivers** and therefore a few rivers are navigable throughout their length. For example the Nile River has 5 major waterfalls and several rapids. The Congo River is navigable up to 140km, but the course is broken by rapids and falls up to Stanley Pool.
2. **Presence of floating islands and vegetation**/Sudd along the courses of rivers such as along the Nile papyrus rids close in and navigation is not possible up to Juba. This also makes the rivers unnavigable throughout their length. Also the existence of swamps and swamp vegetation on lake shores such as Kyoga limits the use of such lakes for transport.
3. **Presence of rock outcrops along rivers and shores of lakes** such as Nile and Lake Victoria. These prevent the movement of water vessels in such areas. The rivers are also fast flowing in the highland areas, and hence a higher risk of accidents.
4. **Fluctuation in volume seasonally/river regime**. Water levels fluctuate between wet and dry seasons. At low water the rivers may not be navigable yet at flood it may be too dangerous. For example the 4200 km long Niger River is subject to marked seasonal fluctuation. Others include: Vaal, Zambezi, and Limpopo.
5. **Shallowness and narrowness of rivers**. Many rivers are too short and too shallow for navigation especially the rivers flowing in mountainous regions like Ethiopia highland areas. There are sandbars at the mouth of rivers which make water shallow making it hard for ocean-going vessels. Also many lakes have shallow waters which limit navigation such as Lake Kyoga, Lake Chad.
6. **Remoteness of rivers**/ many rivers which would be capable of carrying much trade flow through sparsely populated areas and thus water transport there would be uneconomical. A case in point is river Congo.
7. **Rivers tend to meander in their flood plains** making the distance covered by the river much longer than a similar journey on land. Some people chose to use land transport instead of water transport.
8. **Presence of steep-sided valleys** such rift valley lakes –Lake Tanganyika, Lake Albert, and Lake Malawi, rendering water transport on such lakes less attractive.
9. **Low level of economic development in the immediate hinterland**. Some rivers flow across empty and unused land, thereby being uneconomical to use, since the areas lack cargo like river Congo. Yet also some areas lack major water bodies to be utilized for water transport.
10. **Silting of many large rivers** especially at their mouths. This increases the shallowness of channels such as Nile River and Nile delta, and Niger River and Niger delta. There is also siltation of lake shores due to deposition.
11. **Strong winds on lakes and some rivers causing accidents**, in certain times of the year. This limits the use of the lakes and rivers for water transport for fear of losing life and property.
12. **Presence of predators such as crocodiles, and hippos**. These at times over turn boats and threaten the lives of the travelers on water, and hence limit the effective use of water transport.
13. **Limited capital to develop the inland water ways**. Canal construction and the streamlining of rivers (e.g. by blasting rocks) requires a lot of capital. Also establishing ports requires high capital engineering. More so the volume of traffic is too small to warrant development of inland water ways.
14. **Low levels of technology and limited skilled labour** to modernize the inland waterways such as to develop ports and related facilities. This also limits the volume of cargo handled by inland waterways.
15. **Political differences between countries through which the rivers pass**. African countries in some cases do not cooperate yet the rivers cut across many countries. For example political differences between Senegal and Gambia have prevented development of the Gambia River, yet it is one of the most navigable rivers on the continent. Other cases are Uganda and Sudan (the Nile River).
16. **Political instability / lake pirates** such as on Lake Victoria, along river Congo. This puts the lives and property of the water travelers at risk all the time especially in the isolated parts where the rivers pass. Eventually the number of people using the inland water transport reduces.
17. **Competition with faster means of transport such as by road and railway**. These are more convenient and quicker means of transport than water transport. These limit the number of people using water transport.

**PROBLEMS FACED IN THE UTILIZATION OF INLAND WATER TRANSPORT IN NORTH AMERICA AND WESTERN EUROPE**

Inland water transport in Europe and North America involves the use of rivers and lakes. The major rivers in Europe include: Volga, Danube, Rhine, Rhone, Po, Inn, and Elbe. The lakes include Lodoga (N.W Russia), Geneva, Maggiore, Lugano, Lucerne, Constance etc.

The major rivers in north America include: St. Lawrence, Mississippi—Missouri river system, Tennessee, Columbia, san Joaquin, Sacramento, Colorado, Fraser, Yukon, Mackenzie (Canada). The lakes include Greatlakes (superior, Michigan, Huron, Erie, Ontario)

The problems limiting the utilization of inland water transport include:

1. **Freezing of the water ways during winter** which limits their use during this season. For example the St. Lawrence sea way is frozen 3 to 4 months ( December to march)
2. **Flooding of rivers** especially during spring to summer. For example in spring when the winter snow begins to melt and in early summer when the glacial melt water comes down from the Alps.
3. **The rivers meander in their lower courses** which makes navigation difficult. For example, the Mississippi river meanders through the flood plains for about 1600km.
4. **Shallowness and narrowness of river valleys**. The materials eroded upstream is deposited on the river’s bed in the lower section making it shallow and therefore limiting the size of the vessels it can handle. There are also narrow valleys and fast flowing rivers in the highland regions, making navigation very difficult.
5. **Presence of rapids and waterfalls** along river channels .For example Niagara Falls and rapids along the St. Lawrence River. The Rhine River is only navigable up to Basel and beyond this point; there are many waterfalls and rapids especially in the rapids.
6. **Some rivers flow through unproductive and under populated regions**, which also limits their use.
7. **Foggy conditions** cause poor visibility and accidents. For example at the mouth of the st. Lawrence, and this affects shipping.
8. **High costs of maintenance of the waterways** such as costs of constant dredging, construction of canals and locks.
9. **Delays in shipping of cargo**. For example St. Lawrence seaway has many locks used to adjust water levels for navigation( both single and double)
10. **Limitation in the size of ships/vessels especially the canal sections**. Due to ever growing technology, the bigger ships cannot sail through these sections; which affects the delivery of goods. This is a case with St. Lawrence Seaway and Rhine waterway.
11. Water faces **competition from other forms of transport** such as road net work and railway.
12. **Flooding during the rainy seasons** also limits the use of the waterways.

**Steps taken to solve the above problems**

1. Construction of locks in areas where the water levels are different, some single locks and other double locks. For example Beauharnais locks and st. Lambert locks along the st. Lawrence Seaway.
2. Construction of canals to bypass some rapids and waterfalls such as Welland canal which by-passes the Niagara Falls.
3. Constant dredging to maintain the depth of the water channels /rivers by removing the silt to allow large cargo-liners to sail.
4. Construction of dams or barrages which hold back water and give greater depth thus overcoming the problem of shallow channels.
5. Use of ice-breakers during the winter season to enable navigation.
6. Use of alternative routes such as roads and railway in winter when the waterways are frozen. This enables continuous distribution of goods.
7. Blasting using explosives to shatter rocks into small pieces, which can easily be removed. This makes the rivers deep and wide for navigation.

**Guiding questions**

1. Examine the problems encountered in the utilization of inland water transport in either USA or Africa and suggest the steps that can be taken to improve water transport in the chosen area.
2. Examine the influence of inland water transport on urban development in either North America or Europe.

**THE RHINE WATERWAY**

The Rhine is the most important waterway in Europe and is the world’s most efficient waterway system. It is the principle route from Basel in Switzerland to Rotterdam in Netherlands. It is linked with a system of canals which improves its transportation capacity; such as Rhine-Rhone canal, Main-Danube canal, the Mosel-Rhine canal, Dortmund Ems.

The Rhine passes through the most industrialized part of the continent-the Ruhr region) and enters the busiest sea in the world –the North Sea. From the source (Swiss Alps) to the mouth (Rotterdam) it serves 6 Western Europe countries –Switzerland, Germany, France, Netherlands, and Belgium. Its tributaries include: Mainz, Lippe, Mosel, and Ruhr.

***A sketch map showing the Rhine waterway***

**Factors which have favoured the development of the Rhine waterway**

1. ***The availability and exploitation of various mineral resources*** such as iron ore from the Ruhr, coal from the Ruhr and from the Saar coalfields of Germany; limestone from Swiss Jura. These needed to be shipped to industries such as in the Ruhr Westphalia region, Zurich and Berlin in Germany. This has increased the importance of Rhine waterway-hence its development.
2. ***The Rhine waterway is linked with a system of canals*** which improves its transportation capacity. These canals include: Dortmund Ems, Lippeseite canal, Main-Danube canal, Mosel-Rhine canal (connecting to the Lorraine coal fields of France); Rhine-Rhone canal to Basel. This has enabled the Rhine to be a transit waterway for bulky goods from Germany, Switzerland, Austria, and France.
3. ***Strategic location of the Rhine in the centre of Europe***. Still its mouth is on the North Sea which is the busiest sea in Europe. This made the Rhine usable by many vessels in countries such as Belgium, France, Germany, Switzerland, and The Netherlands.
4. ***High level of industrial development***. The Rhine passes through one of the most industrialized parts of the world—the Ruhr industrial complex of Germany and enters the North Sea (the busiest sea). Rapid industry has enabled the Rhine to trans-ship cargo to and from the Ruhr region. The cargo to the interior includes iron ore, cotton, tropical timber, coffee and today the most important is oil. The seaboard goods include automobiles, engineering machinery, chemicals, and general merchandise.
5. ***The rapid development of Rotterdam port.*** The Rhine enters the North Sea at Rotterdam which also owes its growth to the rich hinterland. Rotterdam is an entreport to Europe, has a New Waterway and major industrial establishments. This has also increased the importance of the Rhine waterway.

Apart from Rotterdam, other important ports along the Rhine include Bonn, Koblenz, Mainz, and Basel. This has made the waterway to handle thousands of deep sailing ships handling over 220 metric tons per year.

1. ***The desire to link the Rhine countries*** such as Switzerland, Germany and Netherlands. The Rhine has a position as a unifying factor in Europe. It upon this that the governments have made the Rhine developed such as modernizing Rotterdam port at the mouth, development of canals, New waterway. Political unity among the countries increases the volume of traffic handled by the waterway.
2. ***Ice free conditions of the waterway***. In the lower part of the Rhine, there are ice-free conditions throughout the year due to the effect of the north Atlantic drift ocean current. This enables usage of the Rhine for a greater part of the year.
3. ***The Rhine is navigable for a large part from Rotterdam up to Basel***. For this part it is not interrupted by waterfalls/rapids in its channel this increases its use and the volume of cargo handled by the waterway.
4. ***Presence of adequate capital*** provided by the Swiss, Germany and Dutch governments. This helped to streamline the river for navigation, establishing ports for shipping and purchasing technology used for dredging, straightening and construction of various canals.
5. ***High level of technology***/ Advanced technology is used for dredging, straightening and the vessel construction technology. This in turn increases the number of vessels using the Rhine waterway.
6. ***Presence of highly skilled labour force*** such as engineers, geologists who helped the waterway such as dredging of the waterway to deepen it for use, vessel construction for shipping, port construction, and canal construction. This has increased the importance of the waterway.
7. ***Relative political stability in the area*** where the Rhine waterway flows. This has increased the confidence of investors in developing the waterway and also increasing the volume of cargo transported along the waterway.
8. ***The rapid urbanization in parts of Europe*** where the Rhine passes, hence capable of handling much trade. It flows through the densely populated Ruhr conurbation, Basel area of Switzerland, port Rotterdam area. This makes the use of the Rhine waterway more economical.

**Importance of the Rhine waterway**

1. ***Facilitates trade and commerce through importing and exporting large quantities of commodities***for countries like Germany, France, Belgium, Netherlands and Germany. The upstream cargo(imported goods) comprises of iron ore, coal, crude oil, cotton wool, food stuffs( like wheat, dairy products); and tropical hard wood timber. The downstream cargo (exported goods) comprises of chemicals, vehicles, machinery, diesel engines, newsprint, textiles, optical instruments (like cameras, binoculars from Switzerland), and automobiles especially from Switzerland –Germany. This leads to the expansion of productive activities such as industry.
2. ***Promotion of industrial development*** along the length of the Rhine River, the most spectacular being the Ruhr industrial complex attributed to the cheap water transport for imports and exports. Duisburg is known for smelting, metal works, and chemical industries. Other industrial regions are Rotterdam in the Netherlands, Cologne in Germany, and Basel in Switzerland. The waterway provides cheap and easy transport for bulky industrial raw materials such as coal, petroleum, limestone, steel, iron, agricultural products as well as accessibility to the overseas markets.
3. ***Promotion of port and urban development***, the most spectacular being Rotterdam port at the mouth of the Rhine River acting as the entreport for Western Europe with modern facilities such as containerization use of cranes. Other important towns include Basel, Strasburg, Mainz, Bonn, Essen, Dusseldorf, Leverkusen, and Koblenz. These are developed industrial towns, trade, recreational, and financial centres, and with high population concentration.
4. ***Promotion of mineral exploitation*** for example coal mining from the Ruhr and Saar fields of Germany, limestone from the Jura region of Switzerland. The waterway helps to transport bulky ore from the fields to the processing and smelting centres and to various industries where they are needed as raw materials. This in turn increases the income levels.
5. ***Facilitation of agricultural development*** by opening up agricultural regions such as the alluvial plains of Germany for growing of sugar beet, maize, tobacco, vines and market gardening in Germany; horticulture and cattle rearing in Netherlands. The waterway provides cheap and easy transport to the industries and markets to be processed and consumed respectively.
6. ***Promotion of tourism development in the Rhine lands*** especially in Switzerland apart from the waterway being a tourist potential itself. It provides cheap transport for tourists from Germany, Holland, Belgium, Luxembourg, to the tour resorts. Most of these resorts are linked to the Rhine by road and rail. The resorts in Switzerland include Kloster, Arosa, Davos, Murren, and Kandersteg. This in turn increases the inflow of foreign exchange which is used to import foreign technology and consumer goods.
7. ***Provision of employment opportunities to many people*** such as engineers who carry out dredging, straightening of the waterway, hydrologists who monitor the water levels. There is employment in shipping companies as pilots, cargo handling, and hostesses in passenger liners. They earn income for improving their social and economic welfare /standard of living.
8. ***Generating of government revenue*** by taxing the shipping companies /cargo handling companies pay and workers’ incomes. The revenue is used to develop various sectors such health, education, recreation, and agriculture.
9. ***Facilitation of international relationship between the Rhineland countries*** that is, Netherlands, Germany, Switzerland. The countries ensure diplomatic relationship for the joint and smooth operations on the Rhine. This forms a basis of economic contacts/trade relations and economic integration (such as in the European Union).
10. ***Diversification of the economy in the Rhineland countries***. It has diversified transport in Western Europe but also the economy by providing an alternative source of income /revenue which can be used to develop various activities such as mining, agriculture, service sectors.
11. ***\*Stimulation of forestry development*** by enhancing the exploitation of forests such as the black forests of south Germany, and Haardt forests of central Germany. The Rhine opened up these forests by providing cheap transport means for logs to be floated to the saw mills, furniture workshops and ship building workshops at cologne, Mainz and Basel.

**Negative Effects/Short Comings of the Rhine Waterway**

1. ***Congestion of vessels on the waterway*** due to increasing use of the waterway by many vessels, it limits its size causing delays.
2. ***The waterway limits the size of vessels used on the route***. Due to the ever growing technology the bigger ships cannot sail easily along some sections of the waterway especially the canal sections.
3. ***Silting of some sections of the Rhine River*** and this calls for continuous dredging which is costly yet the period of dredging limits the use of the waterway.
4. ***The upper course of the waterway has rugged relief*** that is, from Basel towards the Alps. This makes the upper part less or not navigable and thus foregone economic opportunities.
5. ***Freezing of the Rhine River during winter season*** especially in the upper course, which limits its use as a waterway.
6. ***The waterway is associated with urbanization and related problems*** such as traffic congestion, slum growth, drug trafficking, unemployment, and high crime rate.
7. ***Pollution problems are associated with the waterway*** such air and water pollution due to moving water vessels, growth of industries due to the discharge of toxic wastes and other urban activities. this is disastrous to the environment ( flora, fauna and aquatic life)
8. ***The Rhine waterway results into regional imbalance in development*** since it has attracted most economic activities along its course from Basel to Rotterdam in Netherlands such as agriculture, tourism, industry, social services at the expense of other areas in the interior.

**Guiding questions**

1. Account for the development of the Rhine waterway as an important waterway in Europe in the area where it is located.
2. For either the st. Lawrence Seaway or the Rhine waterway, assess its contributions to the development of the region where it occurs.

**St. Lawrence sea way**

The St. Lawrence Seaway is the most important waterway in North America shared by Canada and USA. It connects the great lakes region and the Atlantic Ocean on the eastern part of North America.

It stretches for over 3760km (2350miles) from Duluth on Lake Superior to the estuary of the St. Lawrence below Quebec.

The major construction activities along the sea way included:

* Construction of locks in areas where the water levels were different, some are single locks and others are double locks. Examples are: Beauharnois locks, St. Lawrence lock, St. Lambert lock, Iroquios lock
* Construction of dams in some sections to raise the water levels and submerge the rapids such as the Moses Saunders dam
* Construction of canals to by-pass some rapids and waterfalls such as the Welland canal which by-passes Niagara falls a distance of 40mk (Niagara falls is about 99m high (326ft). the drop of 6m (20ft) by a rapid at Sault Ste. Marie is avoided by the Soo canal between Lake and lake Huron. There are also canals that link the seaway to major production areas such as the 320 km Superior canal from Lake Erie at Buffalo via the Mohawk gap and Hudson River to New York. Also the Carillion and Greville canals from Montreal to Ottawa, Rideau Canal to Kingston.
* Constant dredging to maintain a depth of over 7.5m (25ft) to allow large cargo-liners into the Greatlakes (to widen the waterway by removing silt).
* Blasting using explosives to shatter rocks into small pieces which could easily be removed (remove the islands), hence making the river deep for navigation.

**Note:**

* The US and Canadian governments constructed the St. Lawrence sea way which was completed in 1954.
* The main traffic on the water way includes iron ore, coal, grains, (especially wheat), timber, furs, dairy products, metallic ores (nickel, copper, gold) and a whole range of manufactured goods.

 ***A sketch map of the St. Lawrence sea way***

**Factors that favoured the development of the St. Lawrence sea way**

1. ***Availability of large deposits/ a variety of minerals*** which include iron ore, uranium, gold, copper, and coal at the great lakes fields. The sea way was to provide cheap transport for these mineral resources to the major industrial centres such as Montreal, Detroit, Pittsburgh, Chicago, and Toronto. This increases the volume of cargo handled by the seaway.
2. ***High level of industrial development in the great lakes region*** and along the sea way such as in Chicago, Detroit, Quebec, Montreal, Pittsburgh which manufacture bulky products such as automobile, machinery which required cheap means of transport especially to overseas markets. This also increases the volume of goods transported along the seaway.
3. ***Availability of adequate capital provided by both the US and Canadian governments*** shared equally (the project spent over one billion US dollars). This capital was invested in the purchase of modern technology, construction of canals, building of locks in case of different water levels , dredging of the riverbed to deepen it for vessels, and straightening the sea way.
4. ***The high level of technology*** which involved the use of earth movers, excavators for dredging , construction of modern canals and locks, dam construction, which also explains the development of the waterway to navigable level.
5. ***Availability of highly skilled labor provided by the US and Canada*** in form of engineers , hydrologists, surveyors, who carried the feasibility study and construction activities like construction of dams, locks and canals to make the sea way more navigable.
6. ***Political stability in the continent*** of North America for a long period of time which has enabled establishment and maintenance of the seaway. It also increases the confidence of people to transport their goods via the seaway.
7. ***The rapid development of ports making the seaway to handle much trade***. The inland ports include Duluth, Chicago, Detroit, Cleveland, buffalo, Toronto, Montreal, Quebec with major industrial establishments. The sea way can now handle thousands of ocean-going vessels.
8. ***The large scale agricultural production in the region*** such as wheat from the prairies , cotton from north and south Carolina, maize/ corns from Illinois, and Ohio, dairy production in Michigan and Iowa, etc the St. Lawrence sea way was constructed to provide cheap transport for the bulky agricultural products to the major industrial centres and urban markets as well as overseas markets.
9. ***The St. Lawrence Sea way is linked with a system of canals***, which increases its transportation capacity. The canals include the 320mk canal from Lake Erie at buffalo via the Mohawk gap and Hudson River to New York, the Carillion canal and Grenville canal from Montreal to Ottawa, Rideau Canal to Kingston; and these link the sea way to the major production areas, making it a transit waterway for bulky goods to and from the interior.
10. ***Positive / favourable government policy towards the construction and maintenance*** of the seaway. For example by providing the required capital and purchasing modern machinery for construction of the seaway, hiring labour to maintain the seaway. This in turn increases the use of the seaway.
11. ***Strategic geographical location of the seaway in the centre of North America and linking to the Atlantic Ocean***. This enables it to handle large volume of cargo from both Canada and USA. It also transports large quantities of goods (imports) from Europe.

**Economic significance of the St. Lawrence sea way**

* ***The sea way has promoted trade and commerce in the region*** for example Importing large quantities of commodities like iron ore, coal, crude oil, cotton wool, food stuff; tropical hard wood timber. Transporting large amounts of exports from North America such as chemicals, vehicles, machinery, diesel engines, newsprint, textiles, and automobiles. This in turn increases national income.
* ***Promotion of industrial development*** along the length of the St. Lawrence seaway attributed to the cheap water transport for imports and exports. Today the great lakes region is known for smelting, metal works, chemical industries, textiles, automobiles, agro-based industries in Detroit, Quebec, Toronto and Chicago. The waterway provides cheap and easy transport for bulky industrial raw materials such as coal, petroleum, limestone, steel, iron, agricultural products as well as accessibility to the overseas markets.
* ***Promotion of port and urban development*** with modern facilities such as containerization, use of cranes. These include buffalo, Chicago, Duluth, Montreal, Cleveland, Thunderbay, and Toronto. These are developed industrial towns, trade centres, and recreational centres, financial centres with high population concentration. This also increases national income.
* ***The sea way has facilitated mineral exploitation*** for example coal mining from Pittsburgh, and Appalachian coalfields, iron ore from Labrador and Mesabi ranges. The waterway helps to transport bulky ore from the fields to the processing and smelting centres and to various industries where they are needed as raw materials.
* ***Facilitation of agricultural development*** by opening up agricultural regions such as dairy farming at Michigan, wheat growing in the prairies, horticulture and market gardening, maize production, agro-based industries. The waterway provides cheap and easy transport to the industries and markets to be processed and consumed respectively.
* ***The sea way promotes of tourism development in the region***, apart from the waterway being a tourist potential itself. It provides cheap transport for tourists from Europe, Africa and other parts of the world, to the tour resorts. Most of these resorts are linked to the seaway by road, rail and canals. The tourist attractions are the waterfalls and rapids, industries, mining centres of Appalachians, canals, dams and locks. This also in turn increases the foreign exchange and re-investment in the economy.
* ***Provision of more employment opportunities to the people of Canada and USA*** such as engineers who carry out dredging, straightening of the waterway, hydrologists who monitor the water levels. There is also employment in shipping companies as pilots, cargo handling, and hostesses in passenger liners. They earn income for improving their social and economic welfare /standard of living.
* ***Generating of government revenue*** through taxing the shipping companies /cargo handling companies and workers’ incomes. The revenue is used to develop various sectors such health, education, recreation, and agriculture.
* ***The sea way has promoted political harmony/ relationship between the USA and Canada***. The countries ensure diplomatic relationship for the joint and smooth operations on the seaway. This forms a basis of economic contacts/trade relations and economic integration (such as in the European Union).
* ***Diversification of the economy***  because it has diversified transport in North America and by providing an alternative source of income /revenue which can be used to develop various activities such as mining, agriculture, service sectors. This in turn widens the national income and the export base of the two countries.
* ***Promotes the development of other infrastructure*** such ad road and railway network in the Great lakes region, education facilities, canals linked to other areas such as the Hudson-Mohawk canal. This has increased the volume of trade and other economic activities.

**Negative Effects/Short Comings of the Seaway**

* ***Congestion of vessels on the waterway*** due to increasing use of the waterway by many vessels, it limits its size causing delays.
* ***The sea way has limitation in the size of vessels used on the route***. Due to the ever-growing technology, the bigger ships (super tankers) cannot sail easily along some sections of the seaway especially the canal sections. This limits direct delivery of goods into the Great lakes region.
* ***Silting of some sections of the river*** and this calls for continuous dredging which is costly yet the period of dredging limits the use of the waterway.
* ***Freezing of the river during winter season*** which limits its use as a waterway. The sea way is frozen (bound by ice) for 340 4 months in a year (December to march), which limits its use greatly during these months and navigation comes from a standstill.
* ***The sea way has many locks used to adjust water levels*** and ease navigation. These various locks lead to delays in the shipment of cargo.
* ***The Seaway is associated with urbanization and related problems*** such as traffic congestion, slum growth, drug trafficking, unemployment, high crime rate. Fighting such evils is very costly to the government.
* ***Pollution problems are associated with the waterway*** such air and water pollution due to moving water vessels, growth of industries due to the discharge of toxic wastes and from other urban activities. This is disastrous to the environment ( flora, fauna and aquatic life)
* ***The seaway results into regional imbalance in development*** since it has attracted most economic activities along its course such as agriculture, tourism, industry, social services due to easy accessibility at the expense of other areas in the interior.

**Railway transport**