

Geography | World Problems and Development | Fishing

FISHING

The term fishing refers to the extraction of aquatic animals from the seas/oceans and inland water bodies. The aquatic animals include fish, whales, seals, pearls, crabs, shrimps etc. Fishing is one the oldest occupations of man.

Due to advancements in technology and increased demand for proteins, fishing is increasingly becoming an important occupation.

A well developed fishing industry can provide cheap proteins and essential minerals (like calcium, iodine, phosphorus), fish liver oils; employment, industrial development (e.g. making animal feeds, glue, soap, margarine, paints, ink, medicine, perfumes and cosmetics). Today there is protection of international waters to check on the impact of the fishing industry, in order to ensure sustainable exploitation of aquatic life.

Distribution of Major fishing grounds in the world

The world's major fishing grounds (fisheries) are located in the cool waters of the northern hemisphere, although there is also fishing in the southern hemisphere. The fishing grounds include:

1. North West Pacific fishing grounds
2. North East Pacific fishing grounds
3. North West Atlantic fishing grounds
4. North East Atlantic fishing grounds

Other important fishing grounds are:

- a) The Caribbean region
- b) The Peruvian-Chilean coastlines
- c) Maghreb region (North West Africa)
- d) South African coast upto Angola

World fish types

1. Salt –water fish

These spend their entire lives in oceans and seas, and they are categorized as:

(a)Pelagic fish

Fish stay at or near the water surface of seas/ oceans. Examples are herrings, mackerel, sardines, pilchards, brisling, anchovies/anchoveta, menhaden, tuna, swordfish, marlin, mahi-mahi, shell fish

(b) Demersal fish

This lives at the bottom of the seas/ oceans or in deep waters. Fish species include cod, haddock, halibut, hake, plaice, Pollock, flounders, sole, cusk, and Rose fish.

2. Fresh water fish

This is found in inland streams, rivers and lakes. Also in ponds, paddy fields etc the fish species include: Sturgeon, Carp, Roach, Tilapia Nilotica, Nile perch etc

3. Anadromous fish

These stay in both salt and fresh waters. The best example is salmon (*which is extensively fished in North America, particularly from Alaska to Oregon on the pacific coast*). The young salmon live in the sea but after 2 to 5 years, they return to stream where they were born to lay their own eggs or die. (They move in large shoals and find their original breeding / spawning ground. Their migration routes and spawning ground. Their migration routes and spawning grounds are readily spotted and they are easily caught by traps or nets).

Modern/commercial fishing methods

1. Gill netting (drifting)

This is a method used to catch pelagic fish. A net is suspended in water with floats at the top and weights at the bottom. The net hangs vertically in water and the fish are caught by their gills as they try to pass through the net. Once trapped they can move neither forward or backward. When the fish has been caught the net is removed onto the drifter/ ship for processing.

Illustration of drifting method

2. Purse seining

This method is also used to catch pelagic fish living near the water surface. A purse seine net is laid out in a circular form below the water to trap a shoal of fish. The fish shoals are located using an eco-sounder. At the bottom of the net a ring exists through which a rope attached to a small boat passes. The small boat is used to lay the net, which net is suspended by floats at the top and weights at the bottom. The net has a close mesh where fish are caught by gills.

After the circle has been made, the rope is pulled to close the bottom of the net thereby engulfing/ trapping the fish. The net is lifted onto the boat/ seiner.

Illustration of purse seining

3. Long lining

This method is used to catch demersal fish found in deep water. It involves the use of a long main line with attached drop lines which have hooks with baits. The main line / main rope can stretch for several kilometers with about 200 drop lines. The fish are caught as they try to eat the baits. When enough fish has been caught, the line is pulled out of water onto the ship and fish removed for processing.

Illustration of the long lining method

4. Trawling

This method is used to catch demersal fish living in deep waters. A cone-shaped net is dragged behind a ship/ boat called a trawler. A trawl net is a bag-shaped net whose mouth is kept open by otter boards (either wooden or metal) and has weights at the bottom and a slim cod end. Any fish that enters the net is trapped at the cod end and after the trawl net is pulled out of water and emptied onto the ship for processing. The process is repeated.

Illustration of trawling method

Other methods include whaling and sealing. Whaling involves catching of whales. They are located by spotter planes or an eco-sounder and catcher boats with explosives are later used for killing the whales and floated in ships to the processing factories. Sealing involves catching of amphibians called seals that live both in marine and inland water. Seal herds are chased from the sea/ ocean where they are easily killed using game guns and later processed.

The above modern methods are more advantageous than traditional methods which are common in developing countries. The traditional methods include basket method, spear method, hooking, bows and arrows, beach seining, fish poisoning etc in still some countries electricity is used (*fish paralyzed by electric shocks but this is dangerous*).

NORTH WEST PACIFIC FISHING GROUNDS

The North West Pacific fishing ground is the area from the Bering Sea to the East China Sea and it is the world's greatest fishing region. Japan is the greatest contributor to the total annual fish yields in the North West Pacific fishing grounds. The rest is shared by china, North and South Korea, and the eastern former soviet republics.

Within the enclosed sea –the Sea of Okhotsk, Sea of Japan, yellow sea, East China Sea are intensive for both inshore and deep sea fishing.

FISHING IN JAPAN

In the north pacific, Japan has an outstanding fishing industry and today it is the world's leading fishing nation in all activities of fishing. Japan accounts for about 15% of the world's output. Japan exports majorly fish products in addition to industrial items. The major fish species are: sardines, herrings, mackerel, salmon, yellow tail, cuttlefish, tuna, shell fish, cod, bonito, crab, shrimp, Pollock etc. in addition whales and pearls are caught.

Almost 3 million (*a large number of*) Japanese are directly dependent upon fishing for a living. Every Japanese village fronting the sea is engaged in fishing. There is coastal fishing by small boats, offshore fishing by medium-sized boats, and deep-sea fishing by large vessels.

Factors that have favoured the development of fishing in Japan

Physical factors

1. ***Presence of a broad continental shelf with shallow waters*** especially off northern Kyushu and southwest Honshu and this allows sunlight to easily reach the seabed providing ideal conditions for the growth of planktons which fish feed on, hence survival of large populations of fish. Besides the concentration of planktons along the coast attracts pelagic fish like mackerel and sardines to be easily caught. This in turn leads to large quantities of fish caught.
2. ***The meeting of the warm Kuroshio (Kuro siwo) and the cold Oyashio (Oya siwo) currents*** which also creates ideal conditions for plankton growth and as a result pelagic and demersal fish is abundant in the area. The Japanese islands are located in the zone of convergence /mixing between the two great water masses. The large fish stocks lead to increased quantities of fish caught.

The warm Kuroshio Current also provides warm conditions which prevent the freezing of water, thereby allowing fishing to go on throughout the year.

3. ***Presence of a long and highly indented coastline*** which has promoted the development of coastal fish landing ports in the numerous bays and sheltered inlets. The ports include Tokyo, Yokohama, Nagoya, Osaka, Kobe, Toyama, Kagoshima, and Hakodate which increase accessibility to many fishing villages and handling of fish exports. Besides the indented coastline provides good breeding grounds for fish since the strong water waves that would carry the eggs are sheltered off; leads to increased multiplication of fish.
4. ***Japan is made up of islands*** and these include Honshu (the largest), Hokkaido, Kyushu and Shikoku. In addition to these huge islands, there

are over 3000 islands which has increased the fishing villages and in turn increasing the quantity of fish caught and distributed. This also made the Japanese traditionally sea ferring people and hence many have become fishermen.

5. ***The mountainous nature of Japan's landscape with limited lowland.*** Much of the available agricultural land is used in the production of staple food crops like rice and therefore less left for dairy and ranching. This has emphasized fishing as a major source of animal protein supplying about 60% of animal protein in the Japanese diet.

Still the mountainous nature of the landscape has made the population to be concentrated on/near the coast, which releases labour to the fishing industry as well as ready market. This increases production in the fishing sector.

6. ***Existence of large forests to support fishing*** since originally many islands of Japan were forested. This plus the forested former Soviet Republics provided the required timber for ship building for carrying out fish extraction, construction of ports for landing fish and handling fish exports and even making packaging boxes for fish. This increases production in the fishing industry.
7. ***Presence of a variety of valuable fish species*** fished during various seasons both pelagic and demersal; and which exist in large quantities. These include sardines, mackerel, yellow tail, cuttlefish, herrings, salmon, lobsters, cod, shellfish, tuna, and Pollock. These have a variety of uses such as making drugs, cosmetics and glue—hence commanding a large market. This encourages large-scale investment in the fishing industry.
8. ***Northly location of Japan in the cool waters of the northern hemisphere*** and this points to the natural productivity of the cool waters surrounding Japan, in terms of planktons, fish species and yet the cool climate makes fish preservation easy.
9. ***Presence of many rivers and streams*** which bring in mineral salts from inland dissolved in water and this facilitates plankton growth and in turn existence of large stocks of marine fish. The streams/ rivers also provide good breeding grounds for certain fish species like salmon, hence favouring the multiplication of fish, and thus sustainable exploitation. The rivers include: Shinano (the longest) in central Honshu flowing to the Sea of Japan; Tone River and Ishikari River.

10. **Presence of large fishing grounds/ large water bodies.** Japan is bordered by the large Pacific Ocean which is the major fishing ground containing many fish species like tuna, and mackerel. There are also rivers flowing from the interior which act as fishing grounds like Shinano River. These large fishing zones promote large scale fishing investment due to large quantities of fish caught.
11. **Presence of a smooth ocean floor** which promotes the use of modern fishing methods like trawling, and long lining in the Japanese fishing zones and this results into large quantities of fish caught and marketed. A large part of the ocean floor is free from rock outcrops that could affect the landing of fishing vessels and destroy the fishing nets.

Human factors

12. **Availability of large sums of capital to invest in the fishing industry** accumulated from the strong industrial sector and provided by investors. The capital is used to purchase modern machinery for catching fish and the construction of ports for landing fish. There are large corporations carrying out fishing in Japan and these possess big and sophisticated fleets/equipment, processing and canning facilities. These corporations are managed and operate worldwide. There is high quality and quantity production.
13. **Large supply of highly skilled labour employed in the sector** since most settlements are near the coast and fishing being a major sector in the Japanese economy. Many people have been trained in fish extraction, fish processing, transportation and marketing. The coastal settlement has also given the Japanese a long experience in fishing activities. This has led to long-term and large scale fishing investment.
14. **Presence of a large market both domestic and foreign.** Japan has a generally large population (*over 130 million*) and yet it is concentrated along the coast, hence providing a ready home market. Fish also provides about 60% of proteins to the Japanese diet. Besides Japan is located in the proximity of mainland Asia, which countries have large populations to support the Japanese fishing industry (countries like North Korea, South Korea, and China). There is large scale fisheries investment to support the ready market.
15. **Advancement in technology employed in the sector** (Japan leads the world in the invention of modern fishing technology). Modern fishing methods are employed such as trawling leads large quantities of fish catch;

refrigeration plants, floating cannaries and other processing facilities for the preservation of the fish caught for a long period. For example tuna and salmon are caught and processed on spot. This technology has increased efficiency in the fishing industry.

16. ***Adequate/continuous research in the fishing industry*** which has led to many innovations to improve fishing activities. There is research in the breeding habits, feeding and maturation of various fish species. There are also hatching/ breeding techniques used such as for shellfish; which are then released into the waters. This in turn promotes the multiplication of fish and thus sustainable fishing in Japan.
17. ***Efficient transport system*** such as a well-developed sea transport with over 2000 fishing ports (*like Nagasaki, Otaru, Tokyo, Yawata,*) and modern vessels; which facilitates fishing operations/ extraction, distribution and marketing of fish. There is also a modern electrified railway network connecting various fishing ports and urban centres. This increases the supply of fish in the processing factories and the large market.
18. ***Political stability of Japan*** for long period since the Second World War, which increases the confidence of investors and workers in the fishing industry. This factor has enabled long-term and large-scale investment in the fishing industry such as construction of modern fishing ports and modern fishing vessels.
19. ***Ability of the Japanese to put fish to many uses***, which has kept the demand for fish high. Through technology many industries using fish as an input have come up such as making fish meal, fish oils, cosmetics, perfumes, glue, drugs, fish manure ; and thus increase in the fish products on the market. This has prompted further investment in the fishing industry.
20. ***Supportive / positive government policy towards the fishing industry*** such as spearheading research in fishing such as fish spotting, breeding habits of certain species ; leading to increased multiplication of fish. It has also encouraged fisheries investment by large corporations and undertakes fisheries controls. This results into sustainable exploitation of fisheries resources.
21. ***International cooperation***

Problems facing the fishing industry in Japan

1. ***Restrictions in the fishing grounds*** and this has come from excessive efficiency of Japanese fishing fleets. Reductions in fish stocks resulting from

over fishing have forced many countries to protect their fishing waters from foreign interference and as such Japan falls a victim.

- a) South Korea imposed the Rehee—line in the Korean straits as the limit beyond which the Japanese fleets should not go.
 - b) Salmon fishing is limited by a convention with former USSR that sets 48°N as the Japanese fishing limit in north pacific waters ; where as that of USA and Canada is 170°West.
 - c) There are problems with Australia over the use of the Australian coastline water for pearl fishing.
2. **Over fishing** and important species are getting extinct especially the herrings and tuna due efficient fishing methods. Whales are really extinct in the region. Accordingly today there is an international ban on whaling. This reduces the quantity of fish production and more so threatens future production.
 3. **The US tests her atomic and hydrogen bombs in the pacific**, which interferes with the fishermen's schedules and increases the rate of water pollution. This reduces the quality of fish.
 4. **Water pollution problems** due to discharge of toxic substances into the water especially where industries are along the coast and this negatively affects fish survival. This reduces the quantity of fish caught.
 5. **Competition from other major fishing nations** such as Norway, Canada, Peru especially in the control of foreign markets. This limits the foreign market available for fish and fish products.
 6. **Competition from other sectors of the economy** such as industry, which attract labour away from the fishing sector. This limits the quantity and quality of production.
 7. **Accidents** occur due to strong winds that develop due to pressure difference between the sea and the land—leading to strong water waves. This interferes with fishing schedules and limits the volume of fish production.
 8. **Indiscriminate fishing in some areas** involving the use of some methods which scoop large quantities of fish of all sizes and age; and this is leading to the extinction of some valuable species like halibut and cod.
 9. **Freezing of some rivers during winter** also limits fishing sector. For example it limits the movement of some fish species which breed in fresh waters to the spawning grounds.

Assignment (write essay)

Qn. Examine the impact of the fishing industry on the economy of Japan.

NORTH EAST PACIFIC FISHING GROUNDS

This occurs in the sea waters off the western coast of North America extending from Alaska in the north to California in the south. The coastline is about 11200km and is highly fiorded /indented. In the middle belt British Columbia is the most important region.

A variety of fish species occur which include: salmon, hake, herrings, tuna, sardines, sole, halibut, mackerel, flounders and a variety of shell fish. There are also marine sea animals such as whales, oysters, shrimps, and small crabs. Drifting and trawling are the most important methods employed. To a small scale seining and lining are also used. The major fishing and processing ports are: Prince Rupert, Vancouver, Seattle, San Francisco, and San Diego.

A sketch map showing the North East Pacific fishing grounds

Factors for the development of fishing in the north east pacific

Physical factors

- 1. Presence of a wide and shallow continental shelf** (for the whole coast of western North America from Alaska to California) and this allows sunlight to easily reach the seabed providing ideal conditions for the growth of abundant planktons which act as fish food, hence survival of large populations of fish. Besides the concentration of planktons along the coast attracts pelagic fish like mackerel herrings and tuna to be easily caught.
- 2. The meeting/mixing of the warm and cold ocean currents**, that is, the warm North Pacific current and the cold California current in the North East Pacific waters. This also creates ideal conditions for plankton growth and as a result pelagic and demersal fish is abundant in the area. The warm north pacific Current also provides warm conditions which prevent the freezing of water, thereby allowing fishing to go on throughout the year, and thus large quantity of production per year.
- 3. Presence of a highly indented/fiorded coastline** which has promoted the development of coastal fish landing ports (*in the numerous bays and sheltered inlets*). The ports include: Prince Rupert, Vancouver, Seattle, San Francisco, San Jose, anchorage, San Diego; and these increase accessibility

to many fishing villages as well as handling fish exports. Besides the indented coastline provides good breeding/spawning grounds for fish since the strong water waves that would carry the eggs are sheltered off, hence the multiplication of fish.

4. **Presence of off-shore islands** and these include Vancouver, Queen Charlotte Islands; which have increased the fishing villages/ fishing area; hence large quantities of fish caught and distributed.
5. **Limited agricultural resources on the mainland** partly due to the thin infertile soils which characterize much of the adjacent mainland especially to the north of the fishing ground due to past Glaciation. More so, the rugged mountainous terrain (such as the Rocky Mountains, Sierra Nevada ranges) has made mechanized farming more difficult and this in turn has driven many people to the coast to engage in fishing as investors and as workers. This leads to large-scale investment in the fishing sector.
6. **Presence of large stretches of forests to support fishing** for example the temperate forests of British Columbia (*with species like firs, pines, hemlock*) provided the required timber for construction of fishing vessels to help in catching fish, construction of ports to support the landing of fish and even making packaging boxes for fish. This increase the quality and quantity of fish.
7. **Presence of a variety of valuable fish species** and in large quantities fished during various seasons both pelagic and demersal. These include salmon, hake, sardines, mackerel, sole, halibut, cuttlefish, herrings, lobsters, cod, shellfish, and tuna, which have a variety of uses (*such as making drugs, cosmetics and edible oil*). Salmon is the most important because it is both a fresh water and marine species and commands a large market in America and Europe. There are also marine animals caught like whales, shrimps, oysters and small crabs. This leads to increase in production.
8. **The cool temperate climate in the region**, which ensures cool waters for the growth of abundant planktons and survival of various fish species; hence encouraging large scale fish exploitation. Still the cool temperate climate helps in fish preservation and transportation of fish to distant markets while still fresh; which encourages further fisheries investment.
9. **Presence of many rivers and streams** running from the Rockies to the pacific coast such as Colorado River, Columbia River, Fraser River, and Sacramento River. These rivers bring in mineral salts from inland dissolved

in water and this facilitates plankton growth and in turn existence of large quantities of fish. The streams/ rivers also provide good breeding grounds for certain fish species which breed in fresh waters like salmon. Columbia River is the main salmon stream in the region.

10. **Presence of large fishing grounds/ large water bodies** particularly the Pacific Ocean, which is the major fishing ground containing many fish species like tuna, salmon, sole, and mackerel. There are also rivers flowing from the interior which act as fishing grounds like Columbia River. These large fishing zones leads to large quantities of fish catch and thus promote large scale fishing investment.
11. **Presence of a smooth ocean floor** which promotes the use of modern fishing methods like trawling, and long lining in the North East Pacific fishing zones; leading to large quantities of fish caught. A large part ocean floor free from rock outcrops that could affect the landing of fishing vessels or destroy the fishing nets.

Human factors

12. **Availability of large sums of capital to invest in the fishing industry** since Canada and USA are developed and highly industrialized countries . The capital is provided by the governments and private investors. This has been used in the purchase of modern vessels and equipment used in the extraction of fish, the construction of ports for landing of fish, and carrying out fisheries research to develop large quantities of fish. This increases the quality and quantity of fish.
13. **Large supply of skilled and unskilled labour employed in the sector.** Most settlements are near the coast since the interior is forested or rugged –hence releasing the necessary labour for fishing activities such as fish extraction, fish processing, transportation and marketing. The coastal settlement has also given the people a long experience in fishing activities. This has made fishing a long term investment sector in the North East Pacific.
14. **Presence of a large market for fish and fish products both domestic and foreign.** USA has a generally large population (over 300 million) and yet many people are concentrated along the coast, hence providing a ready market. There is a large market in the major urban centres of Canada and most especially USA (such as Los Angeles, San Francisco, Seattle, Salt Lake City, and Las Vegas). Still the fish species especially salmon are highly

demanded in European markets, which has encouraged fish extraction and marketing.

- 15. High level of technology employed in fishing** that is, use of modern fishing methods such as trawling and drifting which enable catching of large quantities of fish. There are also modern preservation involving refrigeration, floating cannaries and other processing facilities, which add value to fish and enable it to be marketed in distant markets. This in turn increases efficiency in the fishing industry.
- 16. Continuous research in the fishing industry** which leads to many innovations to improve fishing activities. There is research in the breeding habits, feeding and maturation of various fish species. There are also hatching/ breeding techniques used and the fish species are then released into the waters to mature. This in turn promotes the multiplication of fish and thus sustainable fishing in Japan.
- 17. Efficient/developed transport system** involving sea transport with many fishing ports (*like Anchorage, San Diego, Seattle, Vancouver,*) and modern vessels; which facilitates fishing operations, distribution and marketing of fish. There is also a modern road and electrified railway networks connecting various fishing ports to market centres in the interior.
- 18. Political stability of the region.** North America has been politically stable for a long time which increases the confidence of investors and workers in the fishing sector. This in turn has enabled long-term and large-scale investment in the fishing industry such as construction of modern fishing ports and modern fishing vessels.
- 19. Supportive / positive government policy towards the fishing industry.** The governments of Canada and USA control fishing activities to limit over fishing, and encroachment on the fishing grounds by foreign vessels. USA and Canada put up 170° West against fishing by Japanese vessels. The governments have also encouraged fisheries investment by large companies and spearheaded fisheries research, resulting into sustainable fishing.

Problems facing the fishing industry in North East Pacific

- 1. International restrictions in the fishing grounds.** Fishing is not allowed beyond 200 miles from the coast due to conventions with other countries like Japan, Australia. The reductions in fish stocks resulting from over fishing have forced many countries to protect their fishing waters from foreign interference.

2. **Over fishing** due to advanced methods of catching fish. Therefore there is great danger of wiping out some of the species for example salmon fish which is often trapped on its way back to the ocean water after breeding in the fresh waters. The fish stocks are rapidly decreasing. Accordingly today there is an international ban on whaling.
3. **The US tests her atomic and hydrogen bombs in the pacific**, which interferes with the fishermen's schedules and increases the rate of water pollution.
4. **Water pollution problems** due to discharge of toxic substances/industrial wastes into the water especially where industries are along the coast. These contain poisonous chemicals which affect fish survival. Still the barks of logs are poisonous to the fish in the rivers.
5. **Competition from other major fishing nations** such as Japan, Norway, Peru, china, especially in the control of foreign markets and thus causing price fluctuations and fluctuations in incomes.
6. **Shortage of labour for fishing sector** due to the small population especially for Canada and due to the fact that many people are employed in other sectors such as forestry, mining and industry. This in turn limits fisheries production.
7. **Accidents** which occur due to strong winds that develop due to pressure difference between the sea and the land—leading to strong water waves that at times lead to capsizing of boats and hence limiting production.
8. **Indiscriminate fishing in some areas** involving the use of methods that scoop fish of all sizes including young ones. Accordingly some valuable species are threatening extinction like halibut and salmon; and thus threatening future production.
9. **Freezing of some rivers during winter** and this negatively affects fishing activities especially in the higher latitudes such as by limiting the movement of fish to the breeding grounds.
10. **Construction of dams on rivers / damming of rivers from the Rockies** due to great demand for power in the US and Canada. This has adversely affected fish spawning / breeding of especially salmon fish which is prevented from reaching the breeding area and hence decline in fish stocks.

Steps being taken to solve the above problems

1. Controlling of fishing activities by government in order to reduce over fishing and indiscriminate fishing. There are stringent regulations/ laws on fishing in particular seasons of the year such as when the salmon fish is moving down to marine waters after breeding.
2. Treating and proper disposal of industrial wastes in order to control pollution of waters.
3. Exporting fish and fish products to other countries to solve the problem of small domestic market. This is coupled with carrying out market research.
4. Setting up more factories that use fish as a raw material such as those producing animal feeds, glue, fertilizers, oil to increase the market for fish.
5. Diversifying fish sources such as by introducing fish farming to supplement the natural sources of fish.
6. Increasing mechanization to minimize the problem of shortage of labour.
7. Signing international fishing agreements to solve conflicts over territorial waters. These agreements recognize fishing rights and grounds for each country.
8. Constructing of ladders for fish to move across the dams. These ladders assist salmon fish to overcome areas where dams have been constructed so that they can reach their spawning / breeding areas upstream.
9. Diversifying the economy to avoid over dependence on fish exports.

NORTH WEST ATLANTIC FISHING GROUNDS

This region is located along the eastern shores of Canada and USA. It extends from eastern Canada coastal lands downwards to the Georgia bank. The North West Atlantic fishing grounds has along coastline of about 8000km, with a fishing area of about 520,000km². The fishing region is categorized as follows:

Canadian fisheries

- a) **Newfoundland and Labrador**—the eastern most province of Canada. Newfoundland is an island and Labrador is on the mainland of Canada. Here fishing provides employment to the vast majority of the population. The region was formerly the world's richest cod fishing area, although catches have declined due to over fishing.

This region also includes the Labrador coast on the mainland of Canada.

- b) **Maritime Provinces, including lower st.lawrence.** The maritime provinces of Canada include: Prince Edward, New Brunswick and Nova Scotia.

In the Canadian fisheries today the main species are: flounder, turbot, halibut, crabs, lobsters, shrimps, herrings, plaice, haddock, oyster, cod, and salmon among others.

USA fisheries

- a) New England. The species are similar to those in Canadian fisheries. Larger vessels are based on larger ports like Boston, Gloucester, Portland, and New Haven.
- b) Central and south coast of USA. Among the variety of fish caught (*similar to Canadian fisheries*), there is also oyster fishing based at Delaware and Chesapeake bays, crab fishing.

A sketch map showing the North West Atlantic fishing grounds

Note: In the North West Atlantic fishing grounds more workers are employed in fish processing than catching. However increased mechanization is making the process capital intensive. The largest percentage of Canada's catch (**about 2/3**) is exported to USA given its large population (high demand) despite having large-scale fishing.

Factors which have favoured the development of fishing in the northwest Atlantic

Physical factors

1. **Presence of a wide/ broad an shallow continental shelf** extending from southern New England to Newfoundland area which provides an excellent breeding ground for fish. It also allows the penetration of sunlight to the ocean floor/ sea bed and this facilitates the growth of planktons-which act as fish food and thus multiplication of large quantities of fish. Besides the concentration of planktons along the coast attracts pelagic fish like sardines, mackerel to be easily fished.
2. **The convergence of the cold Labrador Current and the warm gulf stream.** This occurs off Newfoundland at about latitude 45⁰—55⁰N which condition favours the existence of abundant planktons and hence large stocks of fish. Based on the tides and the general small storms, there is increased supply of oxygen required for life. Still the ice bergs which come south with the Labrador Current bring in minerals from the land important for plankton growth.

Besides the warm gulfstream which washes the Northeast coastline of North America results into the melting of ice which enables fishing activities to go on throughout the year.

3. **The cool temperate climate** which ensures cool waters which favour the growth of abundant planktons and the survival of various marine fish species, hence large-scale commercial fishing. It also favours the preservation and storage of fish which has promoted export trade in fish. However modern canning and refrigeration facilities have also been put up.
4. **Presence of a variety of valuable fish species and which exist in large quantities** which include: flounders, turbot, halibut, herrings, lobsters, plaice, haddock, mackerel, salmon, sardines, cod, shell fish, menhaden in the Canadian and US fisheries. The fish species command a large market since many products are got from them such as oil, fish meal, fertilizers, glue, cosmetics. There are also marine animals like oysters, crabs, and shrimps. This leads to increase in the quantity of fish caught.
5. **The highly indented coastline** which has encouraged fish breeding since it shelters off the strong water waves that would carry away the eggs of the fish. It has also favoured the development of modern fishing ports which include: St. John's, Stephenville, Saint John, Boston, Portland, Providence, Bridgeport, New Haven, and Halifax which support fish landing, processing and exportation.
6. **Presence of many offshore islands** which include Newfoundland (the main island), Anticosti island in the gulf of st. Lawrence, Prince Edward island, Cape Breton island, Sable island among others. These have increased the fishing villages and hence increased fish catch, processing and marketing.
7. **Presence of large stretches of temperate forests** which were used by the early settlers (*like the Dutch*) to make fishing vessels/crafts to extract fish. Still many other Europeans crossed the Atlantic ocean and settled at various points like Boston, Halifax and st. john; and used the timber to make vessels, packaging boxes for fish and also in the construction of ports to handle fish landing, processing and exportation.
8. **Limited productive natural resources in many parts of the mainland.** There are very few minerals on the mainland of New England, yet the soils are poor, thin, rocky, and infertile –implying limited agricultural opportunities. The area also has a short growing season. The Appalachian

Mountains deep inland also limit the agricultural opportunities further especially mechanization. All this has driven many people to the sea to seek a livelihood, hence large supply of labour for fishing and therefore large-scale fisheries investment.

9. ***Presence of many rivers and streams*** which include St. John River, St. Croix River and Restigouche River in Brunswick; Jupiter River on Anticosti Island, Churchill River in Labrador; Exploits River and Gander River on Newfoundland. These rivers bring in mineral salts from the land that facilitate plankton growth and in turn the existence of large stocks of fish. The rivers/streams also act as breeding grounds for certain fish species, hence the multiplication of fish.
10. ***Presence of large fishing grounds/ large water bodies.***
11. ***Presence of a smooth ocean floor.***

Others factors/ human factors

12. ***Availability of large sums of capital invested in the fishing industry*** provided by the US federal governments (of Massachusetts, New Hampshire, Maine, Delaware etc) and the Canadian federal governments (of Newfoundland, New Brunswick, Nova Scotia etc). There are also private fishing companies. The capital is used to purchase modern vessels for fish extraction, construction of modern processing factories and paying fisheries workers. This leads to increased fisheries production.
13. ***Presence of a large market, both local and foreign.*** The local market is especially provided by the urbanized north east of USA (including towns like Boston, St. John, New Haven, New York etc). For example St. John is a large settlement zone with about $\frac{1}{4}$ of Newfoundland's population. There is also market in the eastern cities of Canada. However there is also exportation to other countries especially of processed fish products. This encourages further fisheries production.
14. ***Availability of skilled labour to work in the fishing sector.***
15. ***Advancement in technology.***
16. ***The developed transport system.***
17. ***Political stability of the region.***
18. ***Supportive/ favourable government policy towards fishing.***
19. ***Continuous research in the fishing industry.***

Problems facing the fishing industry in NW Atlantic

1. **Overfishing leading to depletion of fish stocks.** This is due to large-scale operation and modern technology. Some fish species are being threatened by extinction most notable being cod fish which used to be the dominant species in the region.
2. **Water pollution problems,** since the fishing ground is located along the coastline of one of the most industrialized regions of the world. There is heavy discharge of waste material/ substances into the water which endanger fish survival and in turn humans who consume fish.
3. **Poor visibility due to the dense fog.** Therefore, the fishing vessels often run into one another causing accidents. However today vessels are equipped with a radar system which can be used to detect approaching vessels/ships.
4. **Indiscriminate fishing in some coastal areas** and this involves catching of even young fish and the endangered species; and this limits sustainable fishing.
5. **International conflicts over territorial boundaries.** The demarcation of legal fishing grounds per country has often created conflicts over boundaries (which are in most cases imaginary) between USA and Canada; and with European countries.
6. **Competition from other major fishing nations** such as Japan, Norway, Peru, china, especially in the control of foreign markets. This causes price fluctuations and fluctuations in incomes.
7. **Shortage of labour for fishing sector** due to the small population especially for Canada and the fact that many people are employed in other sectors such as forestry, mining and industry. This limits production in the fishing sector.
8. **Freezing of some rivers during winter** and this negatively affects fishing activities especially in the higher latitudes. For example limits the movement of fishing vessels.

Evaluation question

To what extent have physical factors favoured the development of the fishing industry in either Canada or USA?

Note: In this question consider both the North East Pacific fishing grounds and the North West Atlantic fishing grounds.

NORTH EAST ATLANTIC FISHING GROUNDS

This region extends from Iceland to Mediterranean shores. Fishing is highly organized by the European countries especially Norway, Denmark, Spain, Iceland, and United Kingdom. Fishing is carried out all round the year in the shallow waters of the North Sea, although spring is the busiest fishing season (but also the most hazardous due to the stormy weather). The major fish species are: herring, cod and mackerel. Others are haddock, turbot, halibut, hake, plaice, sole, anchovies, pilchards, sardines, skate etc

Fishing is generally best developed where there are least opportunities for alternative gainful employment on land. For example commercial fishing is less important in countries like Sweden, Holland, Belgium where agriculture and forestry are crucial for the livelihood of the citizens.

NORWEGIAN FISHERIES

Norway is the greatest fishing country in Europe accounting for almost 3% of the world's total catch. The main fish species in the Norwegian fisheries include: herring (*which contributes 65% of the total fish catch*), cod, tuna, brisling, and mackerel. The main fishing ports include: Haugesund, Stavanger, Bergen, Tromso, Oslo, and Hammerfest.

The leading Norwegian fishing port is Haugesund and it exports mainly herrings to many parts of the world. Stavanger specializes in canning of brisling fish and sardines, and has one of the most advanced canning industries of Europe. The major fishing methods are: drifting, trawling, and lining.

A sketch map showing the fishing grounds in Norway

Factors for the development of the Norwegian fishing industry

Physical factors

1. ***Presence of large fishing grounds/ large water bodies.*** Norway is bordered by the large Atlantic ocean (*which includes the Norwegian sea and the North sea*) which are the major fishing grounds containing many commercial fish species. There are also rivers flowing from the interior which act as fishing grounds. These large fishing zones lead to large quantities of fish caught and thus promote large scale fishing investment.
2. ***Presence of a smooth ocean floor*** free from rock outcrops that could affect the landing of fishing vessels and also destroy the fishing nets. The smooth ocean floor therefore promotes the use of modern fishing methods like

trawling and lining in the Norwegian fishing zones, and thus large quantities of fish caught.

3. **Extensive/wide and Shallow continental shelf** which allows the penetration of sunlight to the seabed and this promotes the growth of phytoplanktons. The planktons act as fish food that helps in the multiplication and maturing of fish such as herrings, cod, and brisling. Besides the wide and shallow continental shelf from Stavanger to Hammerfest promotes easy catching of pelagic fish like herrings.
4. **Favourable conditions at the continental shelf such as cool waters**, which also contain a variety of mineral salts resulting in the abundance of planktons which attracts fish. The Northly position and cool temperate climate makes the preservation of fish relatively easy-as fish cannot easily be spoilt, and thus enabling the marketing of fish in distant markets.
5. **The effect of the warm north Atlantic drift** which enables fishing to be carried out all year round, by keeping the waters open through the winters. It enables ice to melt but water remains cool enough for fish survival. This leads to large quantities of fish caught per year.
6. **Presence of many rivers and streams** that provide good breeding grounds for various fish species, which breed especially in fresh waters. The rivers also bring in mineral salts from inland dissolved in water and this facilitates plankton growth and in turn existence of large stocks of fish. The rivers include: River Glama (Glomma) in the east, River Tana in the north and several other small streams.
7. **Presence of a highly fiorded/ indented coastline** which has promoted the development of fishing ports such as Stavanger, Trondheim, Bergen, and Oslo in the sheltered areas, which enable fish landing and exportation. The fiords also provide suitable grounds for fish breeding, since it shelters off the strong water waves that would carry away eggs of fish; and thus enabling the multiplication of fish. The long fiorded coast between Stavanger and Hammerfest is noted for cod fishing.
8. **Presence of off—shore islands** which increase on the fishing villages, right from Tromso to Kristiansand. The Lofoten islands form the greatest cod fishing area. Other smaller islands are Vesteralen islands, Vega Island, Andoya and Shetland islands. This results into increase in the fishing areas and thus increased fish caught and this attracts more investment in the fishing industry

9. ***The poor agricultural resources such as rugged terrain / mountainous landscape and infertile soils*** which has driven people to seek a livelihood at the sea and more labour supply. This has led to increased investment in the fishing industry. Approximately 75% of Norway is of high altitude rugged terrain with steep slopes of unproductive land. This in turn increases fisheries investment.
10. ***Existence of many valuable/ commercial fish species*** such as herrings, cod, tuna, brisling, mackerel, halibut, pilchards, haddock, dogfish, and capelin. These species are of high commercial value and in large quantities which has attracted large scale investment in the fishing industry.
11. ***Presence of extensive forests (Norwegian forests)*** with species like spruce, firs, pines favouring the building of ships and boats at Bergen, Stavanger, and Tromso. These ships are used in hauling fishnets and transportation of fish to processing centres/ports. The timber is also used in the construction of modern ports for fish landing and making packaging boxes for fish.

Human factors

12. ***Norwegians have a long Sea ferring tradition*** and this dates back from the times of the Vikings and Norsemen (kings). These encouraged quite often people to become sailors and fishermen. As such, fishing is rooted in culture. This has led to large scale and long-term investment in the fishing industry.
13. ***The cooperative movement/*** highly organized and developed cooperatives engaged in all fishing activities such as fish extraction, processing, preservation and marketing of fish. The cooperatives also enable fishermen to raise adequate capital to invest in all those activities. This leads to increased quantity and quality of production.
14. ***Presence of adequate capital to invest in the fishing industry.***
15. ***Most settlements are at or near the coast/ availability of labour, both skilled and unskilled.***
16. ***Presence of a large market, both internal and external.***
17. ***Well developed fishing technology***
18. ***Continuous research in the fishing industry.***
19. ***Efficient transport system***

20. Political stability of the country.

21. Supportive / favourable government policy towards fishing.

22. International cooperation

Contribution of the fishing industry to the Norwegian economy

- 1. Fishing has promoted industrial development** by providing raw materials. Many industries are now engaged in processing of fish products such as cod liver oil, fish meal, fertilizer, glue. There are various industries at Stavanger specializing in modern canning of brisling fish. Inferior and undersized fish are converted into fishmeal for animal feeding or used in making of fish manure. There are also industries making fishing inputs like ship building and making of nets.
- 2. Generation of employment opportunities in Norway** both direct and indirect employment in the fishing industry such as fish extraction, processing, transportation and marketing. These employees earn incomes which help them to improve their standards of living. They also pay tax to the government to raise revenue.
- 3. Generation of foreign exchange** through the exportation of fish and fish products to various countries like France, Portugal, Italy, Belgium, Sweden, and Spain. Fish is exported in various forms like frozen, dried, pickled(*preserved in salt water*) and canned. The foreign currency earned is used in the importation of foreign technology and consumer goods not available domestically.
- 4. Fishing has promoted urbanization and port development.** The port of Haugesund is the greatest Norwegian port handling herrings and exports cured/preserved fish to various countries. Other important ports are Stavanger, Bergen, Tromso, Oslo, Hammerfest and Trondheim. These ports have trade links with many parts of the world and they are developed urban centres due to increased population and thus the concentration of associated activities like trading, banking, and recreation.
- 5. Fishing has promoted technological advancement and research** due to the necessity to improve fishing technology, preservation and processing in order to keep pace with other fishing countries (like Japan, Canada). Fishing has also led to research into various fish species such as cod, tuna, and sardines—in breeding habits, fish feeding habits, which has increased efficiency in fishing.

6. **Development of other sectors especially agriculture.** Fishing provides fertilizers which improve crop farming like wheat, corns and sugarcane. It also provides animal feeds for dairy farming at Stavanger and Trondheim. This also helps to improve the standard of living of the people and government revenue.
7. **Provision of government revenue** through taxation of the fishing companies, fish exporting companies, and individuals' incomes. This is in turn used to develop many sectors such as health, recreation, education among others.
8. **Promotes international relations between Norway and other countries,** which import the fish and fish products such as Sweden, Portugal, Denmark, Holland, Finland, Spain, France, Belgium, and some African countries. It also relates with other major fishing countries like Japan, Canada, and Peru due to sharing ideas regarding the fishing industry. This in turn promotes economic contacts and increases the rate of capital inflow in Norway.
9. **Development of transport infrastructure in Norway** that is, the construction of roads and rail networks along the coast to access the fishing grounds such as Oslo-Stavanger road and railway. Besides the revenue from fish exports has been used in the rehabilitation and opening up of new feeder roads.
10. **Development of tourism** because many tourists are attracted by large-scale fishing by use of modern technology such as trawler boats, and factory ships. The various fish species like cod, sardines, and brisling also attract many tourists. This also generates foreign currency and creates market for the local goods.
11. **Promoted diversification of the economy** by acting as an alternative source of income for Norway instead of depending on industry or forestry. This makes the economy to remain stable and more so it widens the export base of the country. Besides the fishing industry has minimized the problem of population pressure on land, which land is of poor quality.

Shortcomings/ negative effects

1. **Over fishing and hence reduction in fish stocks** due to the use of efficient fishing methods like trawling and drifting which in turn leads to lowering of fish output.

2. **Indiscriminate fishing which also reduces fish stocks.** This involves catching young fish and endangered species and this leads to inadequate production.
3. **It is a source of international conflicts over boundaries** (*which are in most cases imaginary*) between Norway and its neighbours such as Denmark, Iceland, Sweden, Finland, and USA. These conflicts are a barrier to beneficial diplomatic relations.
4. **Fishing is associated with accidents** leading to loss of life and property. This interferes with fishing schedules.
5. **Depletion of forest resources** due to the high demand for temperate forest species (like firs, pines) for boat making and shipbuilding at Bergen, Tromso has led to depletion of forest resources.
6. **Industrial-related problems** for example pollution due to discharge of toxic gases and other substances which impacts negatively on the environment such as by contaminating water.
7. **Urban-related problems.** Fishing has led to growth of urban centres (such as Bergen, Oslo, and Tromso) but these are associated with many problems such as slum growth, poor sanitation, and hooliganism. The fighting of such social evils is costly to the government.
8. It **has caused regional imbalance in development.** The coastal areas are more developed than the vast interior areas in terms of infrastructure such as recreation, education, and health facilities.
9. **The fishing sector has attracted labour away from other sectors** like agriculture, and industry; hence undermining their development.
10. **Straining the government budget** when financing various fishing—related activities such as research, quality control. This undermines investment in other sectors of the economy.

Problems facing the Norwegian fishing industry

1. **Over fishing leading to reduction in fish stocks.** There are many fishing countries in the North East Atlantic which all use sophisticated weapons. As a result this has reduced fish stocks. For example Norway about half of the world's whaling vessels, a factor that has led to the almost extinction of whales in the North Sea.
2. **Water pollution problems** since industrialized countries border the North Sea where the Norwegian fishing industry is confined. The toxic waste

disposals into the water cause death of fish and endanger plankton survival, also humans who consume the fish.

3. **Competition from other fishing countries on the world market** such as Japan, USA, which all flood the markets with the best fish types with or compared to Norway. This leads to fluctuations in the prices and incomes.
4. **Competition from other countries in the North Atlantic fishing grounds.** There are interferences from international fishing lanes because some of the fishing grounds are located in the waters internationally used for fishing purposes. The competitors include Iceland, Denmark, Sweden, and USA. This limits fish production.
5. **Restrictions in the fishing grounds.** Fishing by foreign vessels is often restricted over a variable distance from the land. This has been prompted by rapidly improving technology in fishing vessels and equipment, and if not restricted this would mean depleted grounds. For example the Norwegian were refused to fish in their reserved fishing grounds.
6. **Accidents** occur especially during the spring season –which is the busiest fishing season and the most hazardous. During this time, the North Sea is characterized by big waves due to pressure difference between the sea and the land. This interferes with the fishing schedules.
7. **Seasonal variation in fish availability.** There is migration of fish from the north to the south and fish stays in waters off the coast from summer until the end of autumn. This has limited fishing activities.
8. **Alternative employment opportunities offered especially in industry** has also attracted the labourforce away from the fishing industry of recent. This also tends to limit fishing activities.

SOUTH PACIFIC FISHING GROUNDS

FISHING IN PERU

Peru is located in South America bordering the Pacific Ocean and is an important fishing nation, although fishing is a recent development. By 1970, Peru was the world's leading fishing nation and at that time it accounted for almost 30% of the world's total catch. However today catches have declined mainly due to indiscriminate fishing.

The main species of fish caught include anchovy, pilchards, tuna, haddock, sole, mackerel, smelt, flounder, lobster, sardines, and shrimp, among other marine species. Anchovy is the most important and is used for making fish meal, a product in which Peru leads the world. Fish meal is used in animal

feed and fertilizer. There are over 50 important fishing ports on the coast of Peru, but Chimbote and Callao are the most important.

Modern fishing is employed and government controls processing with a corporation called Pesca-Peru. The corporation monopolizes the processing of fish meal and fish oils. It also engages in the canning and freezing of especially tuna fish.

Today there are over 100 fish processing factories and the fish and fish products presently account for over 40% of Peru's export earnings. Much of the products are exported to USA, USSR, china, and the European Union.

A sketch map showing the Peruvian fishing ground

Factors for the growth and development of the Peruvian fishing industry

Physical factors

- 1. Presence of along coastline of over 2000km*** and this ensures a large fishing area and commercial deep-sea fishing off the Peruvian coast, which leads to large quantities of fish caught. It is not surprising that there are over 50 fishing ports along the coast, and thus increased fish landing and exportation.
- 2. Presence of a relatively indented coastline*** which has provided good sites for construction of fishing ports such as Chimbote, Callao, Trujillo, Piura, Pisco, and Chiclayo for fish landing and exportation. The indented coastline also provide suitable grounds for fish breeding, since it shelters off the strong water waves that would carry away eggs of fish—hence increased multiplication of fish.
- 3. Extensive and Shallow continental shelf*** which allows the penetration of sunlight to the seabed, which promotes the growth of phyto-planktons. The planktons act as fish food that helps in the multiplication and maturing of fish such as anchovy, tuna, and sardines—hence favouring fisheries development.
- 4. Existence of many valuable/ commercial fish species*** such as anchovies, tuna, mackerel, bonito, sardines, pilchard, haddock, sole, smelt, flounder, lobster, shrimps. There are more than 50 species caught commercially and anchovies are particularly found in large quantities—which has attracted large scale investment in the fishing industry.

5. ***The influence of the cold Humboldt Current (Peruvian current)*** which creates cool conditions for large quantities of phyto-planktons and in turn large populations of fish survive for example anchovy. This leads to increased fish catches.
6. ***Presence of some small off—shore islands*** which increase on the fishing villages for example San Lorenzo Island and other smaller islands. This results into increased quantities of fish caught and thus large scale investment in the fishing industry.
7. ***The limited productive natural resources on the mainland*** such as due to presence of the Atacama Desert stretching from Peru to the south of Chile and the Andes mountains, and this limits settlement and agricultural production. The minerals which exist such as silver and iron ore occur in small quantities hence cannot support the export economy. This has led to increased investment in the fishing industry as the alternative source of livelihood.
8. ***Presence of large fishing grounds/ large water bodies.***
9. ***Presence of a smooth ocean floor***

Human factors

10. ***Presence of adequate capital to invest in the fishing industry.*** This was provided by the government which looked for the alternative to the economy and the vision set to fishing.
11. ***The development of many processing plants at the coast*** such as Chimbote, Callao, and Lima. These process fish into fish meal, fish oil, and animal feeds.
12. ***Supportive / favourable government policy towards fishing.*** The government has spearheaded research and also extended monopoly over the fishing grounds in the south pacific from 22km to 370km from the coast to avoid competition from foreign vessels. It also restricts on the local fishing seasons.
13. ***Presence of a large and ready market, both internal and external.***
14. ***Improved fishing technology***
15. ***Continuous research in the fishing industry.***
16. ***Improved transport system***
17. ***Relative political stability of the country.***

Problems facing the fishing industry in Peru

1. **Over fishing** which has drastically reduced the fisheries potential. This has been brought about by improved technology used and the invasion by the US and Japanese fishing fleets to the Peruvian waters. Over fishing partly accounts for the decline of the anchovy fish in Peruvian waters.
2. **Reduction in guano.** The establishment of a fertilizer plant using guano as a raw material has greatly reduced the guano available as fertilizer to the ocean water planktons and hence a decrease in fish stocks. This is because guano is very rich in phosphorous, nitrogen and potassium which is very essential in fertilizer manufacture.
3. **Stiff competition from other fish exporting countries on the world market since 1970s** such as Japan, china, USA, Norway, and Canada. To her disadvantage, Peru only exports fish meal and fish oil from one fish species (anchovy) compared to other countries exporting a variety of fish species—hence outcompeting Peru.
4. **Competition from other sectors of the economy for government funding.** Although fishing in early 1970s received great government funding but over time it has come under stiff competition from other sectors such as tourism and industry. This has been worsened by the declining fish species due to over fishing.
5. **Limited valuable fish species.** Peru unlike other countries has been noted for one valuable species in abundance –anchovy, which has limited the growth of Peruvian fisheries. However there is in unedible fish species on the Peruvian coast, which hinder fisheries development due to limited uses of such species.
9. **Water pollution problems** due industries along the coast. The toxic waste disposals into the water cause death of fish and endanger plankton survival, also humans who consume the fish.
6. **Inadequate capital to develop the fishing industry** such as improving port facilities and funding research. More so there is limited industrial development. Apart from the fertilizer industry , fish meal and fish oil, Peruvian industries have not explored other fish processing factories like cosmetic , glue etc partly attributed to limited capital.
7. **The El Niño weather phenomenon.** Towards the end and beginning of every year (between December and March) strong winds cross the equator and bring warm water south wards along the Peruvian coast which spread over the cool waters of the Peruvian current. This is mostly a problem

during the abnormal years when the north wind is very strong. This causes fish to migrate southwards into Chilean fishing grounds. It also creates unfavourable conditions for plankton growth and hence affecting fish survival.

8. **Political problems.** After the military coup in 1970 that overthrew president Allende, it led to a decline in the fishing industry given the fact that it scared off the potential investors.
9. **Low levels of technology used in some regions** evidenced by people using poor fishing nets that catch even young fish. Some people even use poor fishing gears , hence limiting production.
10. **Poorly developed transport facilities in some regions**, since Peru is a developing country; yet fish requires efficient transport to the market and processing centres.
11. **Shortage of labor to work in the fishing industry.** This is because Peru's coastal lands are arid and therefore poorly settled, yet even most of the labour is unskilled; hence resulting into under production.
12. **Accidents occur during fishing** for example the capsizing of fishing vessels leading to loss of life and the fish caught.

Steps taken to develop the fishing industry in Peru

1. Conservation measures have been taken to ensure constant fish stocks and to increase fish stocks such as restrictions on the fishing seasons to avoid over fishing.
2. The government has extended the territorial waters from 22km to 370km away from the coastline. This is designed to keep off the invading American and Japanese fishing fleets, making monopoly of fishing in this region to Peru.
3. Fisheries research has been adopted for example at Chimbote in the available fish stocks, its behavior and fluctuations. The intention is better conservation for sustainable fishing.
4. Control of processing by a government corporation called Pesca-Peru, to ensure that all profits that accrue are ploughed back in the fishing industry.
5. Encouraging local people to consume fish in order to increase the home market for fish.
6. Stocking inland waters with improved species to improve on the fish catch.

7. Continuous improvement on the techniques of fishing, freezing, packing and canning.
8. Improvement in transport and communication facilities.
9. Continuous training of manpower to acquire the necessary skills for the fishing sector.

FISHING IN AFRICA

It should be noted that the fishing industry in Africa is not well developed. A few countries can afford big ships and other fishing equipment; although the situation is gradually changing.

In Africa the countries with a developed marine fishing industry include: **South Africa, Namibia**, Angola, Nigeria, Ghana, **Morocco**, Mauritania, and Senegal. These are countries that export fish and fish products (with regard to marine fishing).

The species of marine fish from African coastal waters include: sardines, stock fish, hake, anchovy, barracuda, sole, pilchards, mackerel, lobsters etc. Africa only contributes about 6% of the world total catch and unfortunately many African countries import fish.

Reasons for the low level of development of marine fishing in Africa

1. ***African coasts are generally straight with few indentations***, unlike the coasts of the North Sea or Europe. As such it is not easy to develop ports and does not allow breeding of fish since even young fish require less turbulent water where they cannot easily be carried away by waves. The young fish also do not require open water where they may be eaten by large fish or marine animals.
2. ***Small continental shelf*** for most of the African coastline rarely extending for many kilometers from the coast. This doesn't allow easy penetration of sunlight for photosynthesis in phyto-planktons. It also limits the use of profitable methods like trawling (*for the fish sunk to the bottom*). The east African continental shelf is extremely limited to only 15km from the mainland and the operation is very small.
3. ***Influence of warm ocean currents*** such as the Mozambique current, which do not favour the growth of planktons and therefore low fish populations. Still some ocean currents are strong and interfere with plankton distribution and movement of vessels, many of which are actually non-motorized.

4. **Large areas of Africa are located within the tropics, where temperatures are hot making waters generally warm.** This discourages the growth of planktons, encourages poor fish species and limited fish stocks. The fish that mostly develop in this warm water are always oily and not of good taste. The hot temperatures also make fish spoilt easily; and this limiting fisheries production.
5. **Ideal climate for agriculture.** A reasonable area of Africa receives heavy rainfall which can sustain farming. Many people therefore look at farming as the main source of livelihood and backbone for development. It is only in areas like Namibia, Angola and Morocco with poor agricultural resources where fishing is developed.
6. **Africa has few offshore islands;** which otherwise would have been used to increase the fishing villages. (*The few islands include Canary Islands, East African islands of mafia and Pemba*). This limits the fishing area and thus limited fish production.
7. **Existence of coral reefs particularly along the East African coast.** These coral reefs interfere with fishing and movement of vessels, fishing nets especially trawl to be used in deep waters. This discourages many investors and this limiting production.
8. **Scattered fish species** that is, there are few species moving in shoals due to the scattered nature of planktons, such that even the fish scatter in search for them. This fish occur very far from the shoreline and have a peculiar characteristic of moving very fast. It is therefore uneconomical to apply modern methods like trawling and seining.
9. **Limited capital in many African countries** and this limits the use of modern fishing vessels resulting into low fish catch. Still many countries cannot finance research on fish stock available which limits fisheries development further (*to only a few countries like South Africa, Morocco*). Many countries use poor crafts like canoes and boats.
10. **Low levels of technology employed in many areas,** resulting into low fish yields. Methods like basket trapping, beach seining, simple hooks are still noticed in several areas. Marine fishermen operate from small canoes and their activities limited to a few miles off the shoreline. More so poor preservation methods such as smoking, salting and sun drying are common. This also limits the marketing of fish in distant markets.
11. **Limited market for fish.** Africa's population is still small and hence a small demand for fish and fish products. More so traditional

customs/cultures prevent fish consumption; some African societies take eating fish as a taboo, hence limiting demand. Most areas along the coast are sparsely populated and people relatively poor.

12. Export of marine fish is difficult because of ***stiff competition from the developed countries***, some of which already faced with the problem of over production of fish. This also discourages further investment in the fishing sector.
13. ***Political instability experienced in several areas*** such as Mozambique, Angola, Namibia, Liberia, Ivory Coast. This limits the investment in fishing industry by diverting funds to wars. It also limits the labourforce in the fishing sector.
14. ***Unfavourable government policies towards fishing***. Many African governments have weak policies to control fisheries such as over fishing, indiscriminate fishing among other activities. Where the policies exist, there is weak or no enforcement. This for example results into depletion of fish stocks.
15. ***Invasion by foreign vessels*** which catch much of the fish in Africa's coastal waters for example Japanese and Korean vessels which have in recent years been catching fish off the coast of West Africa. This reduces the fish stocks.
16. ***Poorly developed infrastructure*** connecting the coast and the interior for example poor roads and this negatively affects the marketing of fish and fish products. This discourages further investment in the fishing sector.