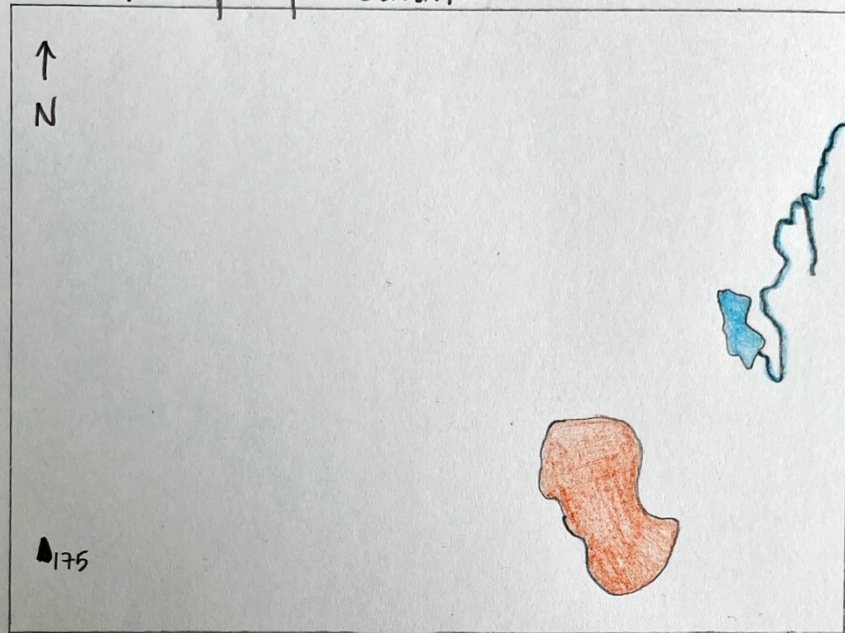






Sketch map of Cavan



Key

-  = The entire area of Lisnannagh Lough.
-  = The course of the Stradone River from where it exits Lisnannagh Lough
-  = The triangulation pillar at Fleming's Holly
-  = The entire area of land above 300m

1:100,000

Igneous rocks are formed due to volcanic activity, when molten rock cools and solidifies. Igneous rocks are categorised by how they cool and solidify. There are known as intrusive/plutonic rocks and extrusive/volcanic rocks.

An example of an intrusive/plutonic rock is granite. Intrusive rocks are formed when magma cools and solidifies within the Earth's crust. The surrounding layers of rock act as insulation and the magma cools very slowly. Granite is formed where an oceanic plate sinks under a continental plate. This is known as subduction. For example, the South American and Nazca plates. Granite can also be formed where two plates collide and buckle upwards to form fold mountains.

Granite can be found in white, pink or grey in colour, depending on the mineralogy present. Granite contains silica-rich minerals, such as feldspar, mica and quartz. Granite is coarse-grained in texture and contains large crystals due to the slow cooling of magma within the depths of the Earth's crust. Granite can be used for the exterior of buildings, monuments and gravestones. It must be highly polished to prevent weathering.

In Ireland, granite can be found in the Leinster Batholith. It was formed over 400 million years ago due to the collision of the North American and Eurasian continental plates. Magma intruded into the folds of rock and cooled and solidified slowly to form masses of granite. The Leinster Batholith is 1,500 km² of an intrusive igneous formation running from Killiney, Co. Dublin to Thomastown, Co. Kilkenny, including the Dublin/Wicklow and Blackstairs mountains.

An example of an extrusive/volcanic rock is basalt. Extrusive rocks are formed due to lava cooling and solidifying on the Earth's surface. It is formed at divergent plate boundaries, where plates separate or where volcanic activity occurs, such as volcanic cones and mid-ocean ridges. This makes basalt the most common rock in the world.

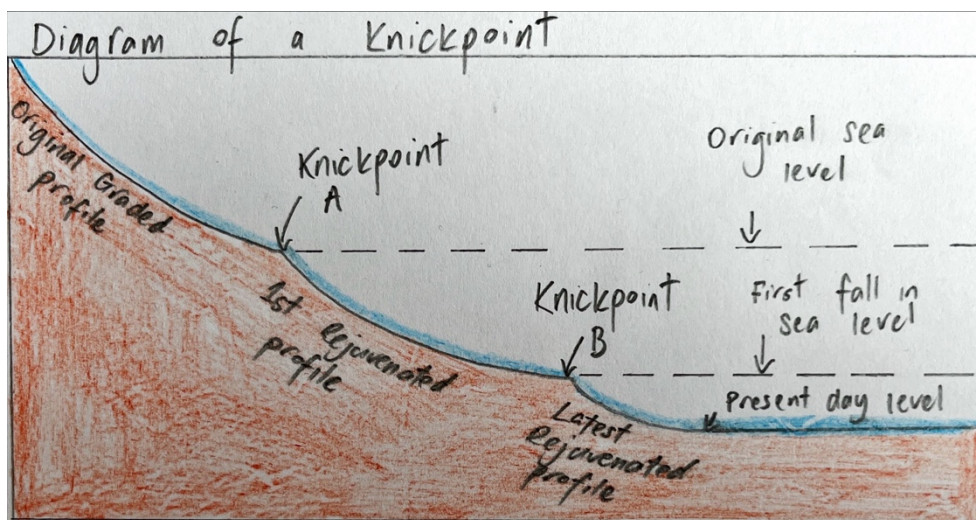
Basalt ranges from black to dark green in colour depending on its mineral content. For example, specs of green in basalt could be due to the mineral olivine present. However, basalt predominantly consists of iron and magnesium. Basalt is fine grained containing tiny crystals, which are too small to be seen with the eye, due to the rapid cooling of lava on the Earth's surface. This does not give adequate time for crystals to form.

In Ireland, basalt can be found at the Antrim-Derry Plateau. The plateau is 4,000 km² in area with a peak height of 350 metres. The Giant's Causeway is a distinct part of the landscape with 60,000 hexagonal columns of slowly formed basalt due to being trapped in a river valley. The lower hexagonal columns are exposed to coastal erosion.

Isostasy refers to the vertical movement of the Earth's crust. This could be upwards due to endogenic/internal forces, such as plate tectonics and folding and faulting. It could be downwards due to exogenic/external forces, such as weathering and erosion.

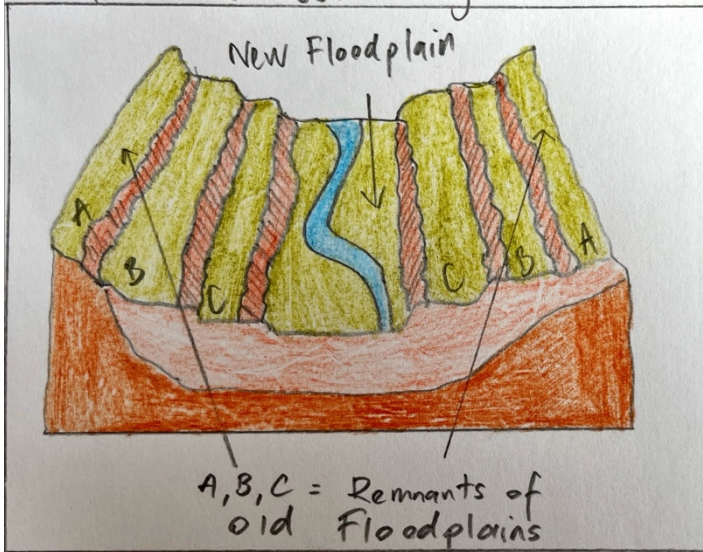
Most isostatic change in the Irish landscape is influenced by the sequence of events during and following the last glaciation. When the crust rebounds after an ice age, the sea level is lower relative to the land. The river finds itself flowing down a steep slope into the sea, increasing the gradient of the long profile. The river cuts down into the landscape, trying to reach a new base level. This moves the river from the old stage to the young stage once again, in a process called rejuvenation.

A knickpoint is a sudden break or change in the gradient of a river at the lower course of the river. It occurs at the point where the river once entered the sea. Due to isostatic uplift the sea level was lowered and the river had to travel a longer distance to the sea, rejuvenating the river to vertically erode the land in order to reach the sea. It marks the point at which the new river profile meets the original river profile. If there is a sharp change in the gradient, the knickpoint is marked by a waterfall or rapids. If a river has undergone rejuvenation on a few occasions, it may have several knickpoints, each separated by a gentle section of long profile. As a knickpoint advances upstream by headward erosion, it removes all traces of the original profile. An example of a knickpoint in Ireland is at Kathleen's Falls, Co. Donegal.



Paired terraces are remnants of former floodplains that have been left high and dry above the present floodplain. After rejuvenation, the river begins to slowly cut into the original floodplain by vertical erosion, creating a new valley at a lower level. The new valley is eventually widened by lateral erosion and a new floodplain forms. The remnants of the original floodplain are then left as paired terraces. They are called terraces because the height of one side corresponds with the other side. A valley may have several paired terraces, depending on how often rejuvenation has occurred. An example of a paired terrace in Ireland is at the River Dodder, Co. Dublin.

Paired Terraces Diagram



- (i) Denmark
- (ii) Portugal
- (iii) France
- (iv) 33.5%
- (v) Switzerland
- (vi) Time:

Air transport is the fastest and most direct mode of transport. This reduces the length of time transporting goods compared to other methods of transport, such as cargo ships. It is the most direct mode of transport, also reducing time, as physical factors such as seas, mountains or forests do not interfere with air transport.

- (vii) Emissions:

Airplanes combust fuels to emit carbon dioxide, water vapor, nitrogen oxide and carbon monoxide. These gases emitted by aircrafts contribute to global warming as they are a pollutant in the lower atmosphere, known as the stratosphere. These gases get trapped within the ozone layer, essentially resulting in increased global temperatures.

An Irish region I have studied is the West of Ireland, which is a peripheral region. Two factors that have influenced the development of agriculture, a primary economic activity, is climate and relief.

Ireland has a cool temperate oceanic climate. The West of Ireland is much wetter, cooler and cloudier than the rest of the country. The south-westerly prevailing winds drive rain bearing clouds and frontal depressions onto this region. The average annual rainfall is 1,700 mm, with more than 250 days of precipitation during the year. This region experiences relief rainfall, especially over the mountainous coastline. This heavy rainfall causes leaching. Leaching is where minerals are washed out of the soil due to heavy rainfall. This reduces soil fertility and impacts agricultural production in the region. This means the region is unsuitable for tillage and the production of cereal crops. Tillage is the growing of crops on ploughed land. Therefore, pastoral farming is the main agricultural land use. Pastoral farming is aimed at producing livestock rather than growing crops.

Average summer temperatures are 14°C and average winter temperatures are 4.5 °C, which is a little bit cooler than the rest of Ireland. The climate lacks the warmth and sunshine necessary for tillage and the production of cereal crops.

Much of the region is dominated by upland relief. For example, the mountains of Connemara and West Mayo, which include the Twelve Pins and Nephin Beg. These mountains have peaks of 730 metres and 627 metres respectively. Relief rain may result in weathering and mass movement throughout the region.

Soils of the upland parts of the region, for the most part, are thin, peaty or absent. Peat soils cover Connemara and West Mayo. Peat developed in cold upland areas that have a lot of rainfall. Peat soils are leached and waterlogged as they retain a lot of water. They are infertile and have limited agricultural potential, such as rough grazing for mountain sheep. However, the ratio of sheep per hectare is low because of the peaty soils and challenging climate in the uplands. Despite peaty soils not being suitable for agriculture, the setting of coniferous plantations, on podzol soils, as an alternative land use has become popular. Mechanisation is extremely difficult in upland areas due to the steep slopes. This impedes on agricultural production alongside thin and waterlogged soils.

Gley soils cover the drumlin lowlands east of Clew Bay and contribute to the basket-of-eggs topography. The soil has a high clay content that impedes free drainage and becomes easily waterlogged. However, gley soils can support the summer pastoral farming. Much of the lowlands of East Galway, East Mayo and Roscommon are covered by the fertile brown earth soils, which develop under deciduous tree cover. The plant litter of the deciduous trees provide humus, a natural fertiliser for the soil, which supports grazing for pastoral farming. Despite this, the parent material of the East Galway lowlands is limestone, these thin soils can dry out in the summer but are suitable for sheep farming.

The European Union (EU) has brought prosperity and stability to all member states. Despite this, there are some potential challenges facing the future development of the EU. These challenges involve the economic union, political union and sovereignty.

The European Economic Community (EEC) was established in 1957 as a free trade zone. That process was completed in 1987 with the Single European Act, when all of the hidden barriers to trade between member states were eliminated. The euro, a common currency, was adopted in 2002 and welcomed by 20 member states. In 2023, the eurozone have a collective population of 341 million people.

Examples of EU countries who do not adopt the common currency are Poland, Sweden, Hungary, Denmark etc. However, they may choose to become member of the eurozone in the future. All members who use the eurozone surrender their power to decide interest rates within their states. This represents a major loss in sovereignty.

The stability of the euro has come into question after the economic crises in 2008, where Portugal, Italy, Spain, Ireland and Greece ran up large budget deficits. The Greek economic crisis lasted until 2017. The troika of the EU, the European Central Bank and the IMF, provided bailouts to the named countries. In return, they had to develop austerity programmes, involving cutbacks in government spending in education, social welfare and public sector salaries. This brought uncertainty to the future of the euro.

The enlargement of the EU presents economic challenges for member states, including Ireland. Ireland had competition from newer member states for attracting foreign direct investment from multinational corporation. For example, Dell computers relocated from Limerick to Poland for lower costs of doing business.

People who are concerned about national sovereignty want to know how much power member states are willing to hand over to the EU. In 2016, this led to Brexit, where the United Kingdom left the EU.

The Brexit debate in the United Kingdom centred on issues of national sovereignty, economic matters and inward migration. Eurosceptics, people who oppose the co-operation and integration with the EU, have highlighted a House of Commons Library study in London, which estimated that 14-17% of laws in the United Kingdom were derived from EU membership.


Britain's exit will cause challenges for the EU. For example, 62% of the population of Scotland voted to remain in the EU in the Brexit referendum. It is possible that the Scottish National Party will seek another referendum on Scottish independence with a view to re-joining the EU. Anti-EU parties in other member states, including the French National Front and Dutch Party for Freedom, have been encouraged by Brexit. These parties could demand a referendum on the future of their countries in the EU.


As Ireland is Britain's closest neighbour, in addition to Northern Ireland being part of Britain, a co-operative relationship exists with no economic and political borders. This relationship must be maintained, especially with Ireland remaining an EU member state.


Political and economic unity has been achieved on many fronts. However, many EU member states have a strong sense of nationalism and by joining the EU this may be under threat. With an influx of foreign nationals to a country, this can bring new cultures and languages and some may feel that their culture is threatened.


Sketch map of Cavan

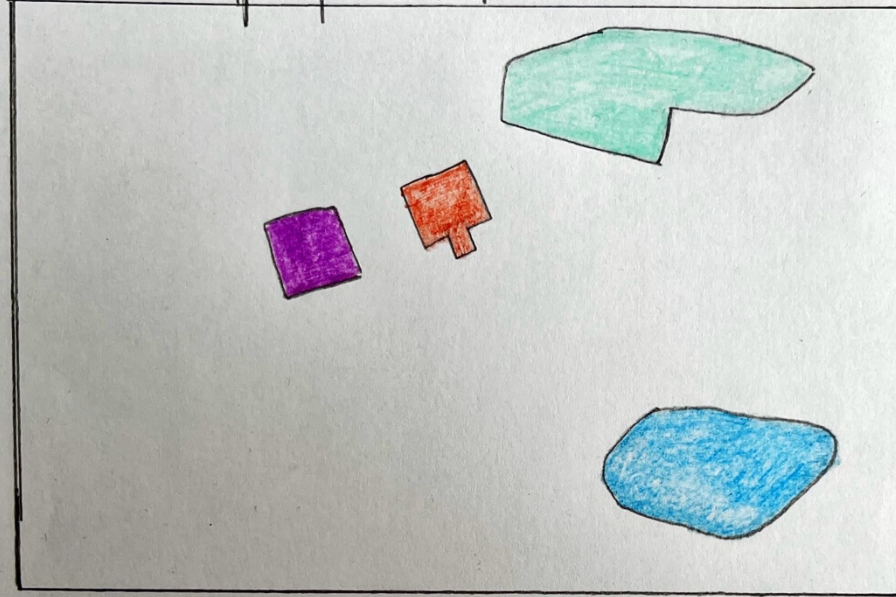
Key-

 = The Lake

 = Ecclesiastical Land use

 = Carpark

 = Residential Land use



The growth of urban settlements may result in issues, such as urban decay and absence of community and urban sprawl.

Urban decay occurs when a part of the city that was previously thriving, both economically and socially, goes into decline. Manufacturing industries relocated to the perimeter of the city, where there was more space and industrial estates were built. This led to high levels of unemployment and poverty in the inner city. Poverty became a push factor, persuading people to leave the inner-city. Old, poorly built homes were no longer fit for purpose. They were damp, cramped and had few modern facilities. People were rehoused in public housing estates or high-rise council blocks. For example, Ballymun, Co. Dublin in the 1960s.

When people were rehoused to Ballymun in the 1960s, the sense of community was fractured, resulting in an absence of community. Extended families were broken up as young families moved to Ballymun with their elderly family members continuing to reside in the inner-city. Young families lost their support system, which were now several kilometres away. Young families felt isolated in their high-rise council blocks that eventually became poorly maintained with broken lifts, damp conditions and no insulation.

Ballymun quickly began to suffer from social deprivation. More than 90% of Ballymun was composed of social housing, as opposed to 10% nationally. The area had high unemployment. Many teenagers left school early and very few went on to third-level education. There was little or no inward investment into the area. Amenities such as sports centres and playgrounds were absent or of poor quality. This resulted in an increase in drugs and petty crime.

Urban sprawl is the uncontrolled spread of urban areas into the surrounding countryside. It became evident in Ireland during the Celtic Tiger years. In 2006, the European Environment Agency expressed its alarm at the extent of urban sprawl in Ireland.

Ireland had a long tradition of home ownership, with people liking to live in terraced, semi-detached or detached houses. In 2023, Ireland had a 66% home ownership rate, down from 70% in 2015. This can be compared to 47% in Germany. By European standards, Ireland has low-density housing because until recently, Irish people were reluctant to live in apartment blocks. Since homes with gardens take up a lot of space, they lead to urban sprawl. In 2024, young families are unable to buy homes. The price of a three bedroom house in Co. Dublin has risen to €400,000. This has forced these young families to move to cheaper homes in towns and villages beyond the periphery of Dublin. Motorways were built across the country, especially outwards from Dublin. This made it easier for young people to buy homes along the commuter belt and commute to Dublin.

Urban sprawl has caused a shift in population outwards from cities to commuter belts. An example of a town that has experienced high population is Ashbourne, Co. Meath. In 1970, Ashbourne had 400 people. In 2006, this rose to 8,528. In 2022, this rose to 15,680. With an increase in population, the government must assure that these commuter towns have enough amenities, such as education, healthcare, transport and leisure.

The 1950s was an appalling decade for outward migration from Ireland. In the decade, from 1951 to 1961, net outward migration reached 411,000 people. Net migration is the difference between outward and inward migration. The population declined to 2.8 million people by 1961, which is the lowest population in the history of the state. The high birth rate of 22 per 1,000 people failed to halt the decline in population and the economy sharply declined.

Sean Lemass was Taoiseach from 1959 to 1966. His tenure saw the beginning of industrialisation, which reduced outward migration. Multinational corporations provided work in newly established industrial estates outside of the city, which led to internal migration from the inner-city to suburbs close to the industrial estates for employment. Lemass drove the First Programme for Economic Expansion which saw a switch from protectionism to free market policies, to encourage commerce and trade. This forced the population decline to halt after more than 100 years of outward migration.

Ireland joined the European Economic Community (EEC – now the EU) in 1973. EEC membership brought a trade agreement with other member states. This brought an export boom, which was accompanied by a growth in employment. Net inward migration reached 104,000 people. This was the first time this had occurred since the Great Famine of the 1840s. The population began to grow.

A global economic recession was triggered by an increase in world oil prices. Outward migration in Ireland rose sharply again, with a net annual average of 24,000 people across the decade. The highest emigration took place between 1986 to 1991. Many emigrants were now third-level educated and this caused brain drain resulting in a big loss to the economy.

The economy rode the crest of a high tech wave as MNCs in the computer, software, healthcare and internet sectors, such as Microsoft and Boston Scientific, came to Ireland. Irish emigrants returned home to take these jobs and were joined by thousands of immigrants who were attracted to Ireland by the pull of better job opportunities. From 2002 to 2006, the peak of the Celtic Tiger, net inward migration was close to 50,000 a year. From 2006 to 2008, net inward migration was 240,900 total.

The banking crisis of 2008, the collapse in properties and external factors plunged Ireland into a recession. Unemployment rose sharply and eventually reached 15.2% in January 2012. From 2010 to 2013, 314,000 people emigrated Ireland to seek better opportunities during the recession. The net outward migration during this period was 99,300 people. For the first time in Irish history, non-Irish people made up a sizeable portion of outward migrations. This was because EU citizens who had worked in Ireland for several years returned home. People who are leaving Ireland may have been public sector workers, such as teachers and doctors, going to countries like Australia and the UAE. People who are coming into Ireland are people seeking work permits outside of the EU and asylum seekers.

The Amazon Rainforest biome has been altered by human activities such as deforestation, intensive agriculture and industrialisation.

Human activities, such as deforestation, has brought significant consequences to the Amazon Rainforest biome, resulting in altered soil characteristics and economic and environmental impacts.

Over the past 50 years, 20% of the Amazon Rainforest has been cut down. Deforestation occurs as there is an ever-increasing global demand for timber building, furniture and paper products as the world's population increases. There is a global demand for hardwoods, such as teak and mahogany. Vast areas of the rainforest have been cleared to accommodate the expansion of grazing land. Smaller areas of forests are cut down for traditional slash-and-burn farming by natives. This method involves slashing trees and burning the stumps. The ash will be mixed in with the soil to increase short-term fertility for agricultural production.

Deforestation leads to the loss of habitat for millions of species. Plant and animal species are interdependent and rely on one another. Many plants depend on birds for pollination. When forest habitats are destroyed, whole species disappear. At least 25% of the world's pharmaceutical ingredients are sourced in rainforests. These include aspirin, quinine and curare. To date, only 1% of rainforest plant species have been tested for their medicinal value. Up to 137 plant species disappear worldwide each day as a result of deforestation. As plant species disappear, we are losing potential to unlock new medicines to fight diseases. Deforestation contributes to climate change. Trees play a crucial role in absorbing greenhouse gases that fuel global warming. Forests can take in carbon dioxide, a greenhouse gas from the atmosphere, and convert it into oxygen which is essential for sustaining life. Deforestation accelerates the speed and severity of global warming.

Deforestation increases soil erosion and soil infertility. Trees provide a protective barrier against heavy rainfall. When trees are removed, erosion by rain and wind removes the unprotected topsoil. When heavy convectional rainfall occurs, leaching washes minerals from the A horizon (topsoil) deep into the soil profile. High temperatures will bake and dry out the soil, turning it into a brick-like soil called laterite. Laterite is too hard to be cultivated which reduces agricultural production due to the infertility. The canopy layer protects the soil from heavy convectional rainfall. The region experiences approximately 2,000mm of rainfall annually. The process of transpiration also ensures that a large amount of rainfall evaporates from the trees or is soaked up by the roots of the trees on the forest floor. Removing this tree cover, will cause soils to become waterlogged and the area to be flooded.

In addition to deforestation, intensive agriculture negatively impacts the Amazon Rainforest by altering soil characteristics, which results in irreversible soil degradation and the loss of native vegetation.

The push by the Brazilian government to continue the expansion of the beef industry has put its plan to reduce deforestation in serious doubt. More than $\frac{3}{4}$ of cleared land is used by pasture, mainly by large multinational corporations. The expansion of intensive commercial agriculture in Brazil is contributing to the loss of 40 hectares of rainforest every minute, every day. Brazil is home to approximately 200 million cattle and is the largest beef exporter in the world, supplying roughly $\frac{1}{4}$ of the global market. Huge areas of the rainforest have been converted into plantations to grow cash crops. The practice of monoculture is used to repay foreign debts. Soya beans cover the greatest area and is used for animal feed and biofuel in Brazil.

Most of the soya bean crop is exported. Brazil is the second largest soya bean producer in the world and earns the country roughly €20 billion per year.

Latosols are the main type of soil found in the Amazon Rainforest. The fertility of the latosol soils quickly deteriorates unless large quantities of fertilisers are used. The latosol soil has natural fertilisers due to the plant litter from the rainforest. The plant litter is converted into a dark, fertile, jelly-like substance called humus by micro-organisms. Humus is churned into the soil, increasing fertility of the latosols. Without tree cover, humus is not created and the soil loses fertility. This encourages the use of chemical fertilisers. There are risks of contaminating rivers with run-off containing agrochemicals and pesticides.

The clearing of rainforests, using slash-and-burn techniques destroy all biodiversity, which are interdependent on one another and to the biome. This upsets the natural nutrient cycle. The loss of plant litter, results in a loss of humus and reduced infertility in the soil. Heavy rainfall results in the leaching of latosol soils, with an impermeable hardpan forming, which means that the soil rapidly loses its fertility. Ranching is not very suitable to the land of the Amazon, as the vegetation quickly depletes the soil of its nutrients. With a few years, the planted pasture becomes overrun with native grasses, which are unsuitable for cattle. Most ranchers choose the cheaper option and clear adjacent forests and move on, with cash crop producers taking over the land. With one crop type, the land will gradually lose fertility. The soil will dry up and may result in a type of desertification, in which the land is unable to support growth of any kind.

Industrialisation has significant impacts on the biodiversity of the Amazon Rainforest, including flora, fauna and indigenous tribes that reside in the rainforest. Industrialisation in the Amazon Rainforest is evident in mining and hydro-electric power (HEP).

The Amazon basin has rich deposits of minerals, including copper, bauxite, iron ore and gold. The Brazilian government provides tax incentives for large-scale mining projects. As mining technologies improve, it is likely that the scale of mining will increase. However, small scale miners are a bigger threat to the Amazon as they enter regions and clear rainforests in search of gold deposits based on rumoured locations. In the Carajas mine, the world's largest iron ore mine, open-cast mining techniques are used. Road building leads to deforestation and encourages small-scale miners to come into the region. Mercury and cyanide are used to separate the gold from the ore. The toxic materials have been spilled on land and washed into rivers, causing health and pollution problems to water supply, humans and fauna. When mining takes place in areas that are settled by indigenous people, conflict can occur. Illegal miners intimidate and often murder native people, forcing them to abandon their lands and move elsewhere. This has been evident with the Yanomami tribe through the invasion by thousands of gold miners.

HEP accounts for 80% of Brazil's electric energy generation. Less than $\frac{1}{2}$ of HEP potential has been tapped with most of this in the Amazon region. As of 2022, there are 158 dams built in the basin, with a further 351 proposed. Dam construction results in large scale deforestation, loss of biodiversity and pollution. It has also created conflict with indigenous and environmental groups. The construction of the Belo Monte Dam, the third largest dam in the world, has seen huge amounts of forest burned and felled and an increased trade in timber. It is estimate that 40,000 people were displaced by the construction of the dam alone. Dams prevent fish swimming upstream, meaning species cannot make it back to their spawning grounds. This affects the river communities that depend on fish for food and income. Huge amounts of carbon dioxide and methane are released into the atmosphere. Methane is 40 times more powerful as a greenhouse gas than carbon dioxide and a major driver of climate change. With the loss of tree cover, these gases will remain in the stratosphere resulting in global warming.