**Human Influences on Biomes**

**Question – Human Influences on Biome**

**Q Human Activities and Biomes: 2008 Question 16**

**Examine two ways in which human activities have altered the natural characteristics of a biome that you have studied. [80 marks]**

**}- Name the human activity you will discuss.}- Name the biome that is affected.}- Describe the human activity.}- Discuss how the biome is affected by the human activity.**

**Acid Rain – European Forests**

**In this answer the impact of human industrial activity on the Coniferous Forest Biome of Northern Europe will be discussed.—Industrial activity in Europe produces acid rain, which has an impact on the soils, vegetation and waters of the coniferous forest biome in that region.—Acid rain is rainwater that has a pH of less than 5.6. The pH scale measures how strongly acidic or alkaline a substance is, a pH of less than 7 being acidic, more than 7 being alkaline and a pH of 7 being neutral.—Acid rain occurs when manmade air pollutants such as sulfur dioxide and nitrogen oxides combine with moisture in the atmosphere. These two gasses are produced by burning fossil fuels in power stations and vehicles. The sulfur and nitrogen oxides combine with water vapour in the atmosphere to create sulfuric and nitric acid. When it rains these fall onto the land as acid rain. When acid rain falls to the land it is called acid deposition. The maximum amount of acid deposition that a biome can receive without damage to the soils and vegetation is called its critical load. It is estimated that in Europe, 20% of forests have acid deposition greater than their critical loads.**

**The impact of acid rain on the vegetation and soil of the coniferous forest biome: —Acid rain damages the vegetation of the coniferous forests in several ways. —First, the acid damages the surface of the leaves. This causes uncontrolled water loss from the leaf pores (stomata) and prevents photosynthesis — the process by which plants make their own food. —Damage to the leaf therefore damages the trees' health and reproductive ability. This reduces forest growth rates since the seeds from acid-damaged trees have lower germination rates. The damage done by acid rain to the coniferous forest in Europe has had an effect on forest production. In Sweden, it is estimated that the loss of growth amounts to €495 million each year. This is a serious loss to an economy where forests are considered to be 'green gold.'—Second, acid rain depletes the soils of essential nutrients such as calcium and phosphorous. This damages the trees' health. —Soils most at risk of acid deposition are those with acidic parent rocks, such as granite and sandstone. Soils under Swedish forests are badly affected by acid rain because most of Sweden is underlain by acidic granite rock.**

**—Third, acid rain can increase the concentration of aluminium in the soil. Aluminium damages the fragile root hairs of a tree, preventing them from absorbing essential nutrients from the soil. So acid rain results in the trees 'starving' since they cannot make or absorb the food they need. In order to neutralise the acid in the soil, it is `limed'. This involves the spreading of powdered lime onto the soil. In Southern Sweden it takes about 3 tonne per hectare of lime to protect a field from acid rain for about 20 years.The impact of acid rain on the rivers and lakes of the coniferous forest biome —Acid rain damages rivers and lakes and also groundwater in the coniferous forest biome of Europe. In Europe, Sweden is the worst affected. In Sweden over 7,500 lakes and 11,000 kilometres of waterway are so badly acidified that they have to be 'limed'. This involves the addition of powdered lime to the water in order to neutralise the acid in the river or lake. Lakes are limed every two to three years but rivers are limed continuously.**

**—Acid rain damages the lake ecosystems by killing off the invertebrates [an animal that does not have a backbone, e.g. an insect or worm] such as snails and fly larvae. This causes water-living creatures, such as frogs and fish, higher up the food chain to starve and die. —When the pH of water is below 5.5 fish die or become seriously ill. This is due to aluminium poisoning caused by acid rain. The aluminium leached from soils by acid rain can find its way into rivers and lakes and this kills fish by damaging their gills so that they cannot breath.—So we can see that industrial activity in Europe has caused acid rain. This has had several impacts on the coniferous forest biome found there.**

**Deforestation in Brazil**

**Intensive agriculture, e.g. soya plantations and cattle ranching.Logging.Demand for wood as fuel.Construction of large dams and reservoirs drown forest.Mining and industry clear forest to reach minerals.Government-organised forest colonisation schemes clear forest for farming.**

**Causes:**

* **Cattle Ranches – 60%**
* **Small-Scale Subsistence Farming – 33%**
* **Fires/Mining/Roads/Dams/Urbanisation – 3%**
* **Logging – 3%**
* **Other activities - 1%**

**These are due to Social and Economic conditions and also Government Policy –‘Avanca Brasil’**

**These factors led to a situation in Brazil where the government began to encourage poor people from the cities to settle in the forest and clear it for farming. In some cases, land was given away. This actively promoted the destruction of the forest.Timber companies were given rights to remove forest and sell timber abroad. The Brazilian government receives a portion of the timber companies' profits and uses it to pay off international debts.Illegal growing and felling of timber is also leading to rapid deforestation, fuelled by a demand for cheap supplies of plywood and tropical timber locally and abroad. Illegal timber is estimated to account for 80% of all timber produced in the Brazilian Amazon.As the area is rich in resources, licences were given to mining companies to clear forests and mine for metals such as iron ore and copper.**

**Roads are being built across the Amazon rainforest to allow access to logging companies, mineral exploration companies, soya plantations, cattle ranches and hydroelectric power (HEP) stations. To construct these roads, large tracts of forest were cleared. The longest road is the Trans-Amazonian Highway, a 5,300 km road, built across Brazil from east to west. This highway was designed to facilitate settlement and exploration of resources in this vast under-populated river basin. It has allowed the movement of people and goods to previously inaccessible areas. Settlement soon followed upon completion of the highway's construction.**

**A new capital city, Brasilia, was built from scratch during the 1950s and 1960s in the heart of the Amazon rainforest. This was to encourage the settlement of the region. Today it has a population of 2.3 million. To construct this city, large areas of forest were cleared. More deforestation occurred on the outskirts of the city where small, temporary housing settlements were built for the migrant workers who moved to this area in order to construct the new capital city. Instead of returning to their original homes upon completion of the city, these workers chose to stay and avail of the greater opportunities in Brasilia.**

**An unlimited water supply and ideal river conditions led to the development of many HEP stations. Over 125 new HEP dams have been built in the Brazilian rainforest area. One example is the Tucuri Dam which caused over 2,500 km2 of rainforest to be flooded. More than 8,000 people lost their homes and thousands of animals died. In January 2000, the Brazilian government announced its plans for Avanca Brasil (Advance Brazil). This is a €30 billion plan to cover much of the Amazon rainforest with 10,000 km of highways, hydroelectric dams, power lines, mines, gas and oilfields, canals, ports, logging concessions and other industrial developments. Scientists predict that these planned developments will lead to the damage or loss of roughly 40% of Brazil's remaining Amazon rainforest. However, the government is finding it difficult to raise the money needed for these projects.**

**There are vast areas of the Amazon rainforest still intact. However, there are now 7,595 companies registered in the Brazilian Amazon and deforestation rates are growing at an alarming rate. This region now produces some 30 million cubic metres of logs a year or 90% of Brazil's total tropical timber production.**

**Intensive agriculture, especially the intensive production of soya beans, is also having a major impact on the tropical rainforest biome. Intensive agriculture completely disrupts the natural ecological balance of a biome.**

* **Deforestation**
* **Destruction of natural habitat**
* **Introduction of exotic species**

**The expansion of intensive agriculture (soya plantations) in Brazil is contributing to the loss of 40 hectares of rainforest every minute day and night. This rate of forest clearance is driven by the increasing worldwide demand for soya and its products.**

**Soils are damaged. Intensive agriculture has a huge impact on tropical soils because of the increased use of agrochemicals and mechanisation which can lead to soil compaction and also soil erosion.}Animals and plants cannot survive in the plantations and so the natural ecological balance that existed is disrupted or completely destroyed.}Plants grown in plantations are not native to the rainforest biome. These huge monoculture soya plantations bring a further threat to the natural habitat with the introduction of genetically modified organisms that have the potential to escape and invade natural communities.All of the above contribute to a loss of biodiversity. Agricultural intensification has also led to the construction of waterways, roads and railroads which have contributed to the destruction of the biome.**

**Rainforests are disappearing at about 40 hectares per minute, day and night. This clearance is having a significant effect on the biome and its people.**

**The area that was home to many native Amazonian Indians is greatly reduced. Their rights have been neglected. It has been suggested that some may have been murdered for trying to resist the clearance of the rainforest by ranchers and forest companies. Workers for the mining and forest companies spread diseases such as the common cold and measles. These diseases have killed thousands of native Indians as they have never been exposed to these germs before and therefore have no immunity to them.}Before 1500, there were approximately six million native people living in Amazonia. By 2000, there were less than 250,000. By the 21st century, 90 tribes of native peoples have been wiped out in Brazil alone.**

**The area of natural habitat for wildlife is severely reduced. Many animals in the rainforest have not been clearly identified yet and as more of the rainforest is destroyed, the opportunity to study and identify these animals is lost.}The loss of many species of plants is a serious cause for concern as some contain chemicals that could one day lead to cures for serious illnesses such as cancer and Aids. We already get many common drugs from different species of tree, e.g. aspirin. About one quarter of all the medicines we use come from rainforest plants. Curare comes from a tropical vine and is used as an anaesthetic and to relax muscles during surgery. Quinine, from the cinchona tree, is used to treat malaria. More than 1,400 varieties of tropical plants are thought to contain potential cures for cancer. These are being lost, cut and burnt at an increasing rate.**

**Global warming. The loss of vast amounts of trees in the tropical rainforests will contribute to global warming. This will happen in two ways:**

**First, the burning of forest adds CO2 to the atmosphere.**

**Second, by removing the forest we are destroying an important 'carbon sink'. A carbon sink is a thing or place where carbon dioxide is taken from the air and stored for a period of time. Plants act as carbon sinks as they use CO2 in the cells of their bodies.**

**When a forest is cleared, the nutrient cycle is destroyed. The remaining soil can be easily washed away by heavy rain. In addition, as a result of the high temperatures in this region, the exposed soil is baked into a hard, brick-like surface which cannot support plant growth. This is known as a laterite soil, which is useless for farming. Settlers who had been persuaded by the government to leave the cities and settle in these areas find that the land they had hoped to work is useless. Many move back to the cities as a result.}The grass growth on the latosols is so poor that the beef cattle do not thrive and even more land is cleared to feed them.**