Human Impact on the Carbon Cycle:

Global Warming:

The amount of carbon dioxide in the atmosphere is increasing due to human activities including:

- mining
- burning of fossil fuels and forests: (combustion releases large amounts of CO_2)
- clearing vegetation for agriculture or settlement (reducing producers decreases photosynthesis and therefore reduces amount of CO_2 removed from the air.)

The excess CO_2 is causing the earth's average temperature to rise which can have devastating effects on the planet
Eg. melting of polar ice caps, flooding of low-lying areas, climate change, etc

THE NITROGEN CYCLE Fig. 1, p.66.

Nitrogen

- makes up approximately 80% of the atmosphere
- required for the production of amino acids (the building blocks of proteins), and nucleic acids

Major Steps in the cycle:

1. Nitrogen Fixation (Nitrification)
   Conversion of nitrogen from the air, which organisms cannot use directly, to nitrates (NO_3^-), a form plants can use
   2 ways:
   by lightning produces small amounts of nitrates that enter soil in rain
   by nitrogen-fixing bacteria found in roots of legumes (peas, clover, alfalfa)
   - produces large amounts of nitrates

2. Nitrates in soil are taken up by plants and are used to make amino acids and then proteins (as well as to produce nucleic acids)

3. Animals eat plants and other animals and use the amino acids form these food sources to make their own proteins

4. Organisms produce waste and eventually die. Decomposers break down nitrogen compounds into ammonia (NH_3)

5. Ammonia is converted to nitrites (NO_2^-) and then nitrates by bacteria and released into the soil. Nitrates can be used again by plants (Step 2)

6. Denitrification - Denitrifying bacteria convert dead organic material and wastes to nitrogen gas which is released into the air

Human Impact on Nitrogen Cycle

In agriculture, fertilizers are used to add nutrients including nitrogen, phosphorus and potassium (N, P, K) to the soil in order to increase plant growth

Problems:

- Too much fertilizer can make the soil too acidic (since nitric acid is produced when nitrates react with water)
- High acidity can have a negative impact on soil organisms (including decomposers) as well as on the growth of plants
- Fertilizer-rich soil runs into waterways in the spring (spring runoff)
  Algae use the nutrients to grow rapidly creating algal blooms which lead to decreased dissolved oxygen available to aquatic animals:
  These blooms block sunlight thereby decreasing photosynthesis by aquatic plants and thus decreasing oxygen production
  When algae die, decomposers break them down, using a lot of oxygen in the process