GGH1501 - Learning Unit 7
Resources – Key Terms

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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<tbody>
<tr>
<td>Acid deposition</td>
<td>The deposition of substances with acid on the land, or in water, due to sulfur and nitrogen oxide pollution of the atmosphere.</td>
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<td>Biofuel</td>
<td>Liquid or gas fuel produced from biomass.</td>
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<td>Cartel</td>
<td>A group of producers that control a particular market by limiting production to drive up the prices.</td>
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<td>Conservation</td>
<td>Efficient use and careful management of resources for maximum benefits or use.</td>
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<td>Consumptive use</td>
<td>Usage of water where the water is evaporated rather than returned into nature as a liquid.</td>
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<td>Fossil fuel</td>
<td>Chemical energy stored in formerly living organisms (plant or animal), eg coal, oil, and natural gas.</td>
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<td>Natural resource</td>
<td>Something that's useful and exists independent of human activity.</td>
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<td>Nonpoint source</td>
<td>A source of pollution coming from a large, diffuse area.</td>
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<td>Nonrenewable resource</td>
<td>A resource that’s being used at rates exceeding the rates at which it replenished in nature.</td>
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<td>Particulate</td>
<td>A small, solid particle in the air which is a component of air pollution.</td>
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<td>Photovoltaic electricity</td>
<td>Electric generation using a device that converts light into electricity.</td>
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<td>Point source</td>
<td>A source of pollution for which a distinct location can be identified where the pollutant enters the environment.</td>
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<td>Pollution</td>
<td>A human-caused increase of substance in the environment.</td>
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<td>Preservation</td>
<td>Limiting resource development for the purpose of saving resources for the future.</td>
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<td>Renewable resource</td>
<td>Something that’s getting produced by nature at a rate similar to what it’s being consumed by humans.</td>
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<td>Reserve</td>
<td>In context of geologic resources, a deposit that has been identified and is commercially extractable at with present prices and technology.</td>
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<td>Sustainability/sustainable development</td>
<td>Resource management and/or economic development that provides the needs of the present without compromising future opportunities.</td>
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<td>Sustained yield</td>
<td>A way of managing a renewable natural resource such that harvest can continue indefinitely.</td>
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<td>Temperature inversion</td>
<td>A layer in the atmosphere, where warmer air lies above cooler air, causing inhibition of vertical circulation.</td>
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Wastewater: Water that was used for a purpose, and returned to the environment as a liquid.

Understanding resources and their value:
* Natural resources are important to all the inhabitants of Earth. However, access to natural resources varies among regions and ultimately adds different values to certain resources. The value of a resource is determined by culture, technology and the economy, but because of the variety of variables involved, competing interests for the same resources need to be somehow balanced. Resource accessibility, competing interests and resource overuse are all factors that complicate the management of the natural resources.

The identification of a natural resource and the distinction between a renewable resource and a non-renewable resource:

Natural resource:
• Is anything that’s created by natural processes that people use.
• Examples include plants, animals, coal, water, air, land, metals, sunlight and wilderness.
• Important to geography because they’re specific elements of the atmosphere, biosphere, hydrosphere and lithosphere with which people interact.
• Can be distinguished from human made resources.

Is defined by:
1. Culture:
   - Influences the demand for commodities and affects society’s willingness to influence supply and demand with policies.
2. Technology:
   - Influences the ability to use certain resources and the relative costs and benefits of using those resources.
3. Economic system:
   - Influences whether a resource is affordable and accessible. Supply + demand = determining affordability.

Renewable resource:
• If the resource is naturally produced at rates similar to our use.

Nonrenewable resource:
• Resource used at rates far exceeding the rates at which it’s replenished in nature.

The aspects that define the use and value of a natural resource:

A natural resource is defined by:

1. Cultural values – influence demand for commodities, and also affect society’s willingness to influence supply + demand through policy.
2. Technology – has a tremendous influence on our ability to use certain resources, and on the relative costs + benefits of using those resources.
3. Society’s economic system – affects whether a resource is affordable + accessible. In market economy, supply + demand are the principal factors determining affordability.

**Use + value of natural resources:**

1. Cultural values:
   - To survive humans need shelter, food + clothing and make use of a variety of resources to meet their needs.
   - We can build homes of grass, wood, mud, stone or brick.
   - We can eat flesh of fish, cattle, pigs, etc – or consume fruits + veggies.
   - We can make clothing from animal skins, cotton, silk, etc.
   - Cultural values help us to identify things as resources to sustain life.
   - A swamp = good example of how shifting cultural values can turn an unused feature into a resource.
   - A century ago swamps were used as humid, buggy places where diseases thrived – they were only valued to dump waste or to convert into agricultural land.
   - Eliminating swamps = good because removed the breeding ground for mosquitoes + created more land.
   - During 20th century the cultural values changed = we became more aware of the value of natural ecosystems + role of swamps in controlling floods, providing habitat for wildlife, and reducing water pollution.
   - Changing public attitude towards swamps is reflected in our vocabulary = we now call them wetlands.
   - Wetlands = valued land, protected by law.
   - We restore damaged wetlands, create new ones and restrict activities that might harm them.

2. Technology:
   - Utility of a natural resource depends on a society’s technological ability to obtain it and adapt it to the society’s purposes.
   - Example = metals = elements can be formed into materials that have high strength in relation to their weight, can withstand high temperatures + good conductors of heat.
   - A metal ore = not a resource if we don’t know how to recover and shape it into a useful object, such as a tool, coin, etc.
   - Earth = may substances we don’t use because we don’t know how to extract or use them.
   - Potential resources – things that may become resources in the near future.
   - Radioactive uranium = had little value until we developed technology to use it in weapons + generating electricity.

3. Economics:
   - Natural resources acquire a monetary value through exchange in a marketplace.
• Price of a substance in the marketplace + quantity that is bought + sold = determined by supply + demand.
• Commodity that requires less labor, machinery + raw material to produce will sell for less than a commodity that’s hard to produce.
• Greater supply = lower the price, greater the demand = higher the price.
• Consumers = pay more for commodity if they need it.
• Consumers = buy more if product’s price = low than when it’s high
• Externalities – exchanges of commodities that take place outside the marketplace and thus have no price attached at the time of exchange.
• Example = a coal-fired power plant = generates air pollution in process of generating electricity = plant doesn’t pay for it, but if they did they would probably search for ways how to reduce the pollution, having less effect on people around the plant’s ‘ health.

**Multiple uses for the same resources:**

• Most resources can be used for several purposes, and most needs can be met in several ways.
• Many natural resources are valued for specific properties:
  - Coal – heat it releases when burned
  - Wood – strength + beauty as building material
  - Fish – source of protein
  - Clean water – its healthiness
• Most cases, several substances may serve the same purpose, so if its scarce or expensive, another can be substituted.
• Copper = conductor of electricity, expensive in relation with other wire made out of other metals that can be substituted.
• Only one specie of sperm whales = no alternative or substitute.
• If one commodity becomes scarce or expensive = another cheaper alternative are found.

**Strategies used to balance competing interests in natural resources:**

• Political + economic relations = central to any situation in which competing interests battle for control of a scarce resource.
• Example = 2011 U.S. Environmental Protection Agency issued new rules for pollution from power plants in eastern U.S.
• The debate:
  - Environmentalists = argued that rules would reduce the health + ecological effects of pollution
  - Electric utility industry = argued that increased costs to utilities would hurt economy.
• Government regulators = normally make use of economic principles in deciding how to manage resources.
• Market economies = values that society places on different uses of resources = reflected in the places of resource commodities.
• Demand for electricity influences price we’re willing to pay.
• Cost of health care affects amount we’re willing to spend on pollution control to protect our health.
• One market-based approach to pollution control = system = cap-and-trade = maximum is set on the amount of pollution that will be allowed, and different polluters can buy and sell permission to emit the pollution substance in question.
• Companies that uses less carbon dioxide than they require, sell their pollution permit to other companies that uses more carbon dioxide than they’re allowed to use.

* One of the most important aspects to realise when studying natural resources is that a resource can be used in various ways. Ultimately this is what creates a competing interest for resources. Competing interests for natural resources cannot be fully understood without also understanding the value of natural resources. The value of a natural resource is very dynamic because changes in technology and the economy can easily increase or reduce the value of a specific resource. For example, the value added to wind through technology means it has become a valuable resource for electricity in many locations around the world. This in turn also adds value to land areas where sufficient wind is available for energy production.

**The spatial distribution of the world’s resources:**

The Earth provides us with a vast array of natural resources that we can use, ranging from the air that we breathe to the food we consume and the commodities we use to complete our daily activities. These resources are not distributed evenly throughout the world, which creates a need for trade and results in development differences. The focus of this sub-section is on the spatial distribution of natural resources over the world. In order to highlight this spatial distribution we will focus on the use of energy, minerals, water and forest resources.

**The relative location of the major oil exporting and importing countries:**
Exporting =  
- Middle East  
- Former Soviet Union  
- West Africa  
- North Africa  
- Mexico

Importing =  
- USA  
- Europe  
- China  
- Japan  
- India

The rate at which the world is consuming non-renewable resources:

- It's important to know for how long our non-renewable resources will be available.
- Estimates about the amount of fossil fuels remaining = carry large amount of uncertainty because new deposits remain to be discovered and some deposits may be in forms or places that make them too expensive to recover.
- We do have some idea of how much is available.
- Ratio of reserves to annual production (R/P) is an indication of the number of years the known reserves will last.
- World R/P ratios for oil + gas = 51 and 57 years, respectively, while the ratio for coal = 125 years.
- We appear to have enough fossil fuels to last decades at least, should we choose to use them.

The various options for alternative energy as well as the potential benefits and drawbacks of these alternatives:

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| Wood fuel        | • Mostly used in poorer countries, because it's easy to take down a tree and get wood. | • Loss of trees  
|                  |                                                                          | • High CO2 levels gets send into the air when wood gets burned.             |
| Hydro-electrical:| • Hydropower is fueled by water, so it's a clean fuel source, meaning it won't pollute the air like power plants that burn fossil fuels, such as coal or natural gas. | • Loss of biodiversity  
|                  | • In addition to a                                                        | • Loss of natural beauty                                                  |
| sustainable fuel source, hydropower efforts produce a number of benefits, such as flood control, irrigation, and water supply. | • Takes up a lot of land to produce the crops, where it could rather be used for the production of food to eat.
• While some consider their use "carbon neutral," the machinery required to farm the plants for biofuels does create carbon emissions, this machinery is also typically not powered by biofuels |
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| • Biofuels are a renewable energy source in that they are created from plants that can be regrown each year.  
• Biofuels also do not require many changes (if any) in cars and other places of use to be utilized.  
• Some consider the use of biofuels as carbon neutral since the carbon produced when burning them is offset by the carbon consumed by the plants they came from. |  |
| **Photovoltaic power:** |  |
| • Brings down the rate of what the electricity costs. | • It’s not very reliable, because it varies with season and weather. |
| **Geothermal energy:** |  |
| • It’s renewable, meaning that as long as we don’t pump too much cold water into the earth - cooling off the hot rocks - the energy will just keep on coming!  
• Doesn’t produce pollution, and at the same time, it doesn’t contribute to the greenhouse effect!  
• The power stations for geothermal energy don’t take up a whole bunch of room, and because of this, they tend to have less of an impact on the surrounding environment.  
• Because geothermal energy is energy in and of itself, no outside sources of fuel are needed to keep the power houses running. | • You just can’t set up a geothermal power station anywhere you want. First of all, you’ll need a location that offers just the right kind of hot rocks. Just any hot rocks won’t do, since some rocks might prove too strong to drill through. These rocks also need to be within a reasonable depth to make drilling down to them a feasible option. Volcanic areas often provide the most geothermal efficiency.  
• There’s also another risk to consider - sometimes a geothermal site might, well, literally run out of steam. And when this happens, the dry spell |
• Geothermal efficiency offers an even more exciting benefit to the frugal homeowner - once you’ve built the geothermal power station, the energy is nearly, well, free! While it may require a little energy to actually run the pump, you can tap into the energy that is already being produced to handle this task!

may last for periods that reach into the decades!
• The potential danger of geothermal energy - When you are drilling into the earth and steam is able to escape, other - not so friendly - things might escape too.
• Hazardous gases and minerals can seep up from beneath the ground, and finding a way to safely dispose of them may prove very difficult and dangerous.

Wind generation:
• Renewable
• Pollution free

Conservation:
• Highly diverse + most are readily available.
• They include simple things – turning off lights, insulating buildings, replacing incandescent lightbulbs with compact fluorescents.
• Some are encouraged by government policy.

• The increase in price ranges – can be managed by tax policy or it can happen as a consequence of trends in the marketplace driven by supply + demand.

The main uses of water:
Categories:
• Commercial – uses fresh water for hotels, restaurants, offices, military institutions, etc.
• Domestic – includes water used in homes every day, for normal household purposes, like cooking, drinking, bathing, washing dishes, etc.
• Industrial – a valuable resource to the nation’s industries for such purposes as processing, cleaning, dilution, and cooling manufacturing facilities.
• Irrigation – water that’s artificially applied to farm orchard, pasture and crops.

Uses:
• Water for livestock
• Mining water – uses water for the extraction of minerals.
• Public supply – water withdrawn by water suppliers for domestic, commercial and industrial purposes.

The spatial distribution pattern of deforestation and forest growth around the world:
The most important uses of forests:
- Recreational resources – the wealthier countries are undeveloped and have open space for hiking, camping and other outdoor activities.
- Forest offers a strong contrast to the noise, commotion, crowding and pollution of the cities.
- Their shade and water offer relief from the summer heat.
- Some forests are located in mountain areas, offering amenities like skiing, climbing, and cooler weather of high elevations.
- Forests are habitats for some game animals, making them preferred areas for hunting and fishing.
- Tropical forests are important for diversity, containing large numbers of tree species and complex vertical habitats.
- Forests contains species that gets used for medicinal purposes.

From the spatial distribution pattern of natural resources you should be able to deduce reasons for uneven global development. Global development has been dealt with in the previous learning unit but it is important to realise that natural resources provide a springboard for development, especially industrial development. The spatial distribution of natural resources also has a significant impact on our ability to extract and use natural resources. The extraction of certain natural resources, like oil and natural gas, requires skill and specific infrastructure. Given the characteristics of development and populations explained thus far in the module and the location of natural resources, it is evident that some resources become “more accessible” than others and that the redistribution of resources is often unbalanced. It also means that
in future, the search for alternative forms of energy will have a significant impact on
the distribution of development in the world.

**Resource use and abuse**

Our dependence on natural resources does not come without consequence. Extracting resources means altering the natural environment in which they occur and potentially disrupting the processes that allow natural resources to regenerate. The consequences of using natural resources for development are both positive and negative. Thus, it becomes crucial to determine whether the negative impacts outweigh the positive impacts. The following sub-section focusses on this balance, the ways in which natural resource use causes pollution, and the need, in some cases, to determine alternatives to improve sustainability.

**The demand and supply relationship for natural resources and the implications of increased demand and reduced supply:**

As the population’s growing, more and more people need food and other natural resources. The demand for the resource increases, but implications like natural disasters, a shortage, etc of the resource can lead to a reduced supply. It influences the supply and therefor its harder to keep up with the demand. Normally at this stage the price of the resource will increase, because of the lack of the resource.

**The main sources of water pollution and possible solutions to water pollution:**

- Water = renewable resource
- Water pollution = results when more waste is added than the receiving water can accommodate.
- Water = dissolve a wide range of substances + transport bacteria, plants, fish, sediment, toxic chemicals + other kinds of trash.
- Water pollution occur when substances enter the water faster than they can be carried off, diluted or decomposed.
- Some sources come from a point source – they enter a stream at a specific location, such as wastewater discharge pipes.
- Others = nonpoint source – they come from a large diffuse area, as happens when organic matter or fertilizer washes from a field during a storm. Normally pollute in greater quantities + harder to control.
- Agricultural lands = the dominant source of nonpoint pollution in most of the world, although atmospheric sources such as acid deposition derived from air pollution can also be important.

**Solutions:**
- Use water wisely. Do not keep the tap running when not in use. Also, you can reduce the amount of water you use in washing and bathing. If we all do this, we can significantly prevent water shortages and reduce the amount of dirty water that needs treatment.
- Do not throw chemicals, oils, paints and medicines down the sink drain, or the toilet. In many cities, your local environment office can help with the disposal of medicines and chemicals. Check with your local authorities if there is a chemical disposal plan for local residents.
- Buy more environmentally safe cleaning liquids for use at home and other public places. They are less dangerous to the environment.
- If you use chemicals and pesticides for your gardens and farms, be mindful not to overuse pesticides and fertilizers. This will reduce runoffs of the chemical into nearby water sources. Start looking at options of composting and using organic manure instead.
- If you live close to a water body, try to plant lots of trees and flowers around your home, so that when it rains, chemicals from your home does not easily drain into the water.
- Never throw rubbish away anyhow. Always look for the correct waste bin. If there is none around, please take it home and put it in your trash can. This includes places like the beach, riverside and water bodies.

**The main sources of air pollution and possible solutions to air pollution:**

**Causes of Air pollution**

1. **Burning of Fossil Fuels:**
   Sulfur dioxide emitted from the combustion of fossil fuels like coal, petroleum and other factory combustibles is one the major cause of air pollution. Pollution emitting from vehicles including trucks, jeeps, cars, trains, airplanes cause immense amount of pollution. We rely on them to fulfill our daily basic needs of transportation. But, there overuse is killing our environment as dangerous gases are polluting the environment. Carbon Monooxide caused by improper or incomplete combustion and generally emitted from vehicles is another major pollutant along with Nitrogen Oxides, that is produced from both natural and man made processes.

2. **Agricultural activities:**
   Ammonia is a very common by product from agriculture related activities and is one of the most hazardous gases in the atmosphere. Use of insecticides, pesticides and fertilizers in agricultural activities has grown quite a lot. They emit harmful chemicals into the air and can also cause water pollution.

3. **Exhaust from factories and industries:**
   Manufacturing industries release large amount of carbon monoxide, hydrocarbons, organic compounds, and chemicals into the air thereby depleting the quality of air. Manufacturing industries can be found at every corner of the earth and there is no area that has not been affected by it. Petroleum refineries also release hydrocarbons and various other chemicals that pollute the air and also cause land pollution.

4. **Mining operations:**
   Mining is a process wherein minerals below the earth are extracted using large equipments. During the process dust and chemicals are released in the air causing massive air pollution. This is one of the reason which is responsible for the deteriorating health conditions of workers and nearby residents.

5. **Indoor air pollution:**
Household cleaning products, painting supplies emit toxic chemicals in the air and cause air pollution. Have you ever noticed that once you paint walls of your house, it creates some sort of smell which makes it literally impossible for you to breathe.

Solutions:
1. Walk or ride a bike when possible.
3. When driving, accelerate gradually + keep with the speed limits.
5. Add insulation to your home.
6. Print + copy on both sides of the paper at work.
7. Start a recycling program.
8. Paint with a brush instead of a sprayer.
9. Eat locally, shop fresh from your local market.
10. Buy products from sustainable sources such as hemp and bamboo.

The spatial distribution pattern of global air pollution:

The definition and characteristics of the concept “sustainability”:  

Sustainability:
- The use of Earth’s limited resources by humans in ways that do not constrain resource use by people in the future.
- Geographers emphasize that each resource has a distinctive capacity for accommodating human activities.

Guidance for preparation of MCQ’s:
(Note that Learning Unit 7 will be assessed by MCQ’s only)

Defining natural, renewable and non-renewable resources:

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**Defining and identifying fossil fuels and alternative energy sources:**

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- Pollution free

- The blades of the wind-turbines kill birds.

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- Some are encouraged by government policy.

- The increase in price ranges – can be managed by tax policy or it can happen as a consequence of trends in the marketplace driven by supply + demand.

**Point and non-point sources of pollution:**

Point source = source of pollution for which a distinct location can be identified where the pollutant enters the environment.

Non-point source = source of pollution that comes from a large, diffuse area.

**Defining and explaining the concepts of sustainability and sustainable development:**

**Defining:**

**Sustainability:**
- The use of Earth’s limited resources by humans in ways that do not constrain resource use by people in the future.
- Geographers emphasize that each resource has a distinctive capacity for accommodating human activities.

**Sustainable development:**
- Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

**Test Yourself:**

1. Food preferences and taboos serve as an example of how … influences determine the value of a natural resource. *(Sec B, pg 344)*

(1) technological
(2) economical
(3) cultural
2. The monetary value acquired by a natural resource is determined by…
   (Sec B, pg 344-345)
   a) the accessibility of the resource
   b) the supply and demand for the resource
   c) the price of externalities associated with the use of the resource
   d) the number of different uses for the resource

   (1) Only (a) and (b)
   (2) Only (c) and (d)
   (3) Only (a), (b) and (d)
   (4) Only (a)
   (5) (a), (b), (c) and (d)

3. A cap-and-trade system refers to a market system…(Sec B, pg 347)

   (1) in which caps are produced and traded
   (2) used to cap the amount of pollution emitted by a company
   (3) that is based on the principles of fair trade
   (4) in which natural resources can be traded

4. For which one of the following countries did no change occur in the percentage of land area devoted to forests between 2005 and 2010? (Sec B, pg 362)

   (1) Nigeria
   (2) China
   (3) Ecuador
   (4) South Africa

5. The largest oil exporters in the world are located in …, while the largest oil importers in the world are located in …(Sec B, pg 350)

   (1) The Middle East; Europe
   (2) West Africa; Europe
   (3) China; Japan
   (4) Middle East; Mexico

6. Which one of the following countries produces the least amount of lithium? (Sec B, pg 355)

   (1) Chile
   (2) Australia
   (3) Brazil
   (4) Argentina
7. Which one of the following statements about the use of water as a natural resource is false? (Sec B, pg 356-359)

(1) The biggest demand for the use of water comes from industries.
(2) Water is a renewable resource.
(3) Water is a crucial resource for both hydropower and nuclear power.
(4) Water quality is directly related to its ability to dissolve and transport chemicals.

8. Which one of the following statements related to the use of minerals is true? (Sec B, pg 354-355)

(1) Cartels are established when numerous countries have the ability to produce a required mineral.
(2) Once the use of a mineral has been established and globally accepted, it cannot be substituted by any other minerals.
(3) The prices of minerals are determined without any consideration of political stability.
(4) Technological advancements have a potentially significant influence on the price of minerals.

9. From the world map showing the spatial distribution pattern of nitrogen dioxide in the troposphere (figure 14.9.2, Section B, page 360 of the prescribe textbook) it can be deduced that ...

(1) the worst air pollution occurs in the less densely populated parts of the world
(2) air pollution is evenly distributed all over the world
(3) there is a spatial association between areas with high air pollution levels and a high population density
(4) air pollution patterns are changing over time

10. What is the main difference between sustainability and conservation? (Sec B, pg 364-365)

(1) Sustainability concerns renewable resources while conservation concerns non-renewable resources.
(2) Sustainability is a multidimensional development concept while conservation is focussed on one aspect at a time.
(3) Sustainability concerns non-renewable resources while conservation concerns renewable resources.
(4) Sustainability is a long term concept and conservation is a short term concept.