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HUMAN IMPACT ON THE ENVIRONMENT

27 AUGUST 2014



Lesson Description

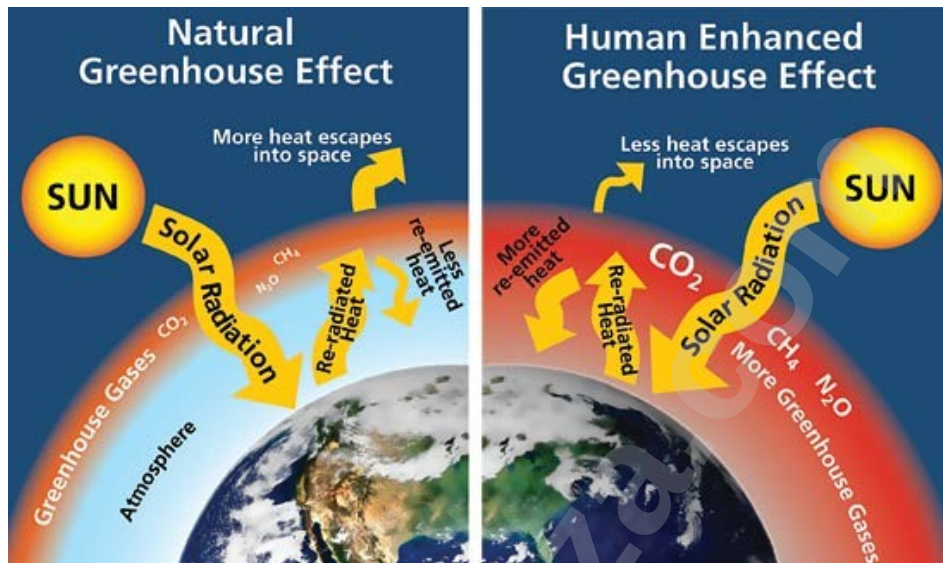
In this lesson we:

- State what is meant by the greenhouse effect and why it is important for life on Earth
- Describe the sources of carbon dioxide emissions and methane emissions (greenhouse gases) which lead to the greenhouse effect.
- Describe how deforestation leads to an increase in the CO₂ concentration.
- State when the 'greenhouse effect' becomes known as the 'enhanced greenhouse effect'.
- Describe how an increase in greenhouse gases (enhanced greenhouse effect) leads to global warming.
- Describe how global warming may lead to desertification, drought and floods.
- State what is meant by carbon footprint and describe ways in which we can reduce our 'carbon footprint' in order to de-crease global warming.
- Describe the causes and consequences of ozone depletion and list ways in which we can decrease ozone depletion
- Describe how various factors influence the availability of water
- Describe how various factors reduce water quality
- Describe how water quality may be increased through water purification and how water availability may be increased through the recycling of water
- State what is meant by food security and describe how food security is influenced various factors
- State the importance of maintaining biodiversity and describe how various factors may reduce biodiversity
- Describe how various factors may reduce the loss of biodiversity
- State why we should reduce solid waste or find ways of managing it.
- Describe the following aspects of solid-waste disposal:
 - The dangers associated with open dumpsites
 - Ways in which dumpsites can be managed for rehabilitation and prevention of soil and water pollution
 - The use of methane from dumpsites for domestic use, such as heating and lighting
 - The need for recycling
 - The need for safe disposal of nuclear waste

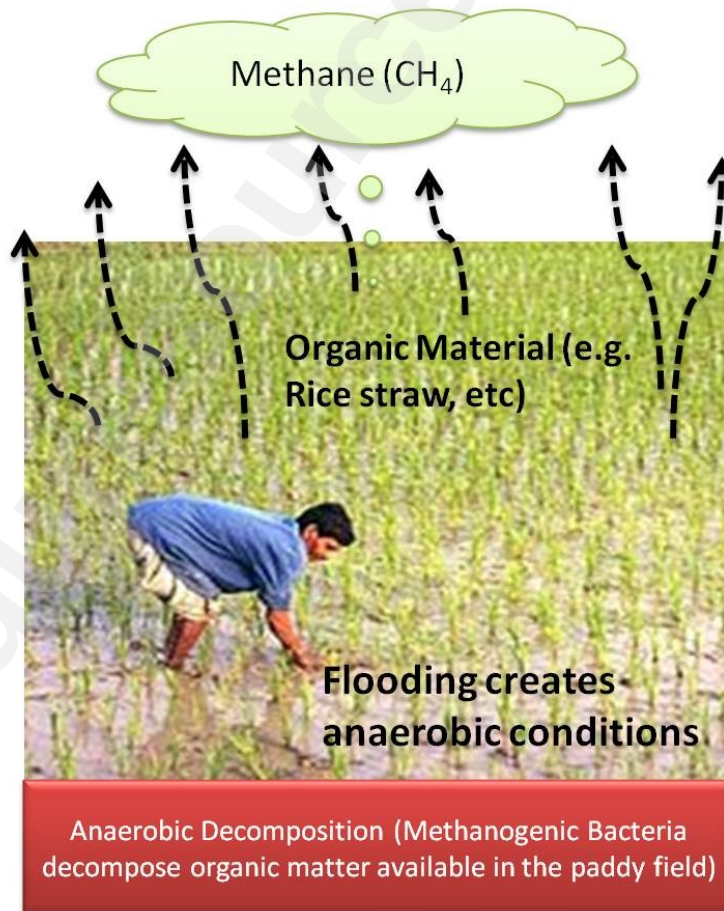


Summary

The Greenhouse Effect



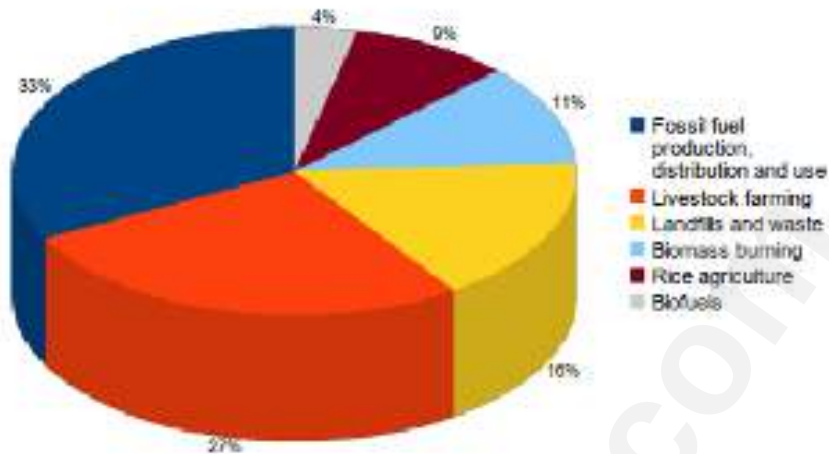
Sources of Carbon Dioxide and Methane Emissions



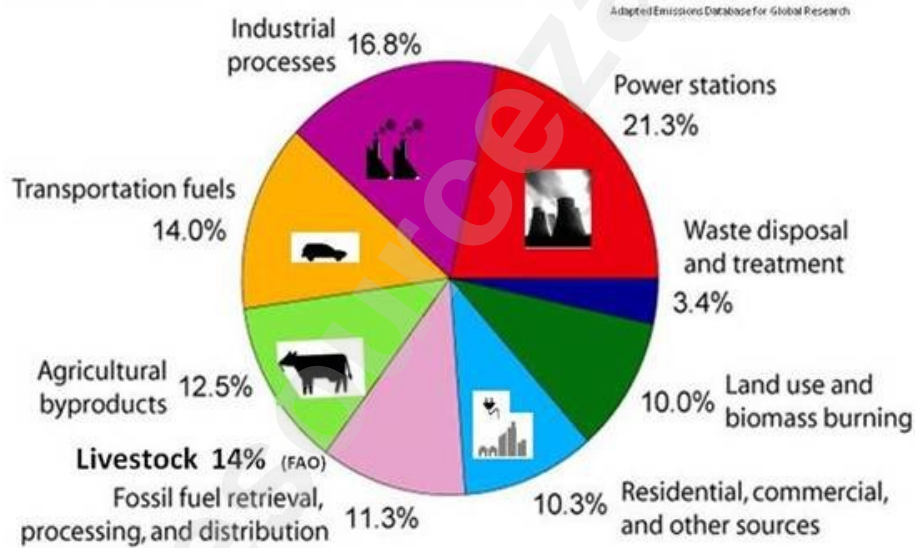
Rice Paddy Field

notes for...

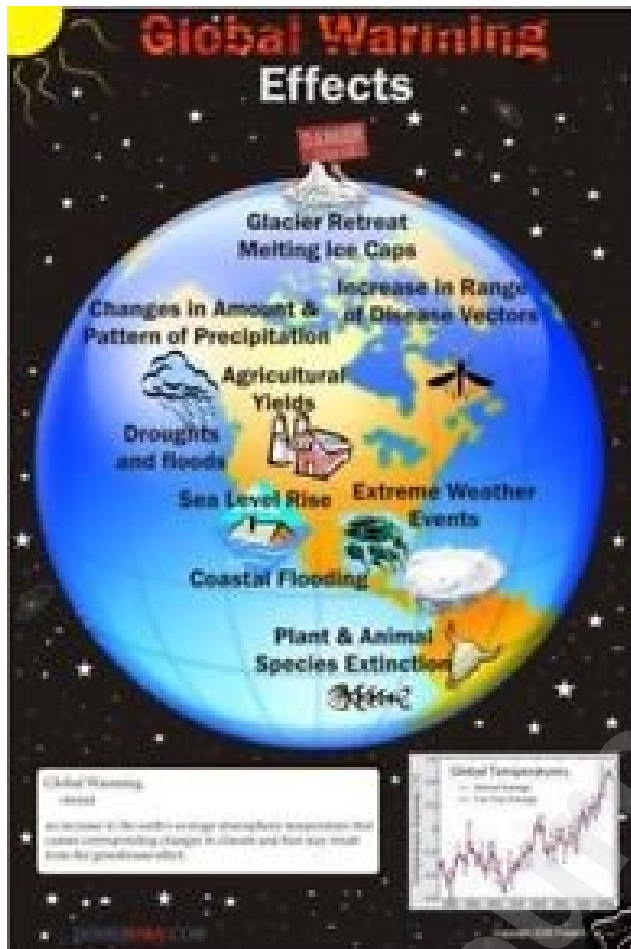
Human sources of methane



Annual Greenhouse Gas Emissions by Sector

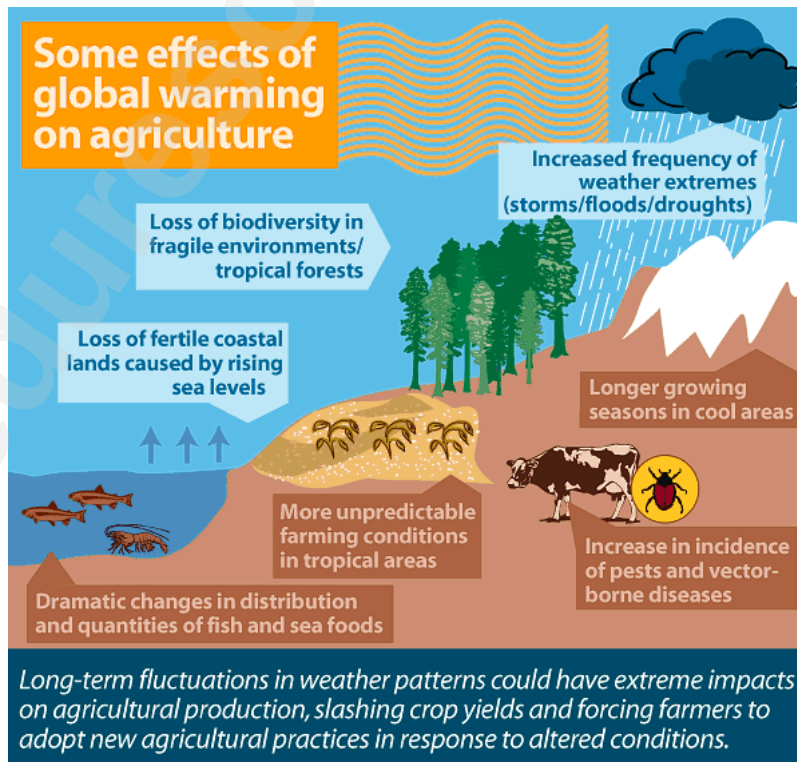


Effects of Global Warming



EFFECTS OF CLIMATE CHANGE

Phenomenon	Likelihood
Warmer days. Less cold days/nights	Virtually certain
More warm spells and heatwaves	Very likely
More heavy rain events	Very likely
More areas hit by drought	Likely
More intense tropical cyclones	Likely
More extreme sea levels (not tsunamis)	Likely



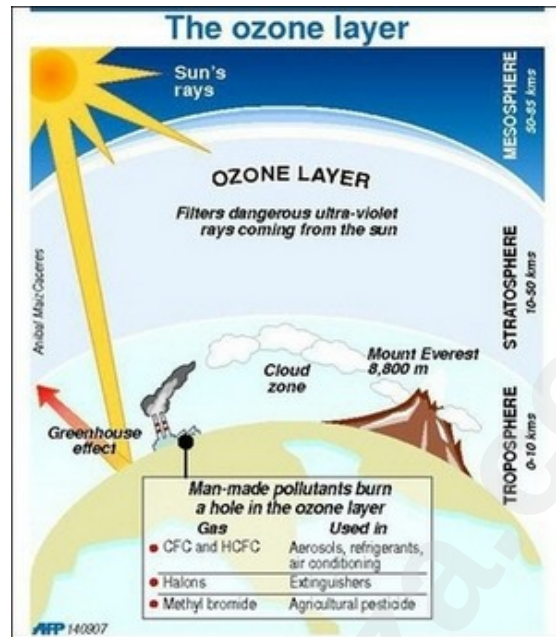
The Carbon Footprint



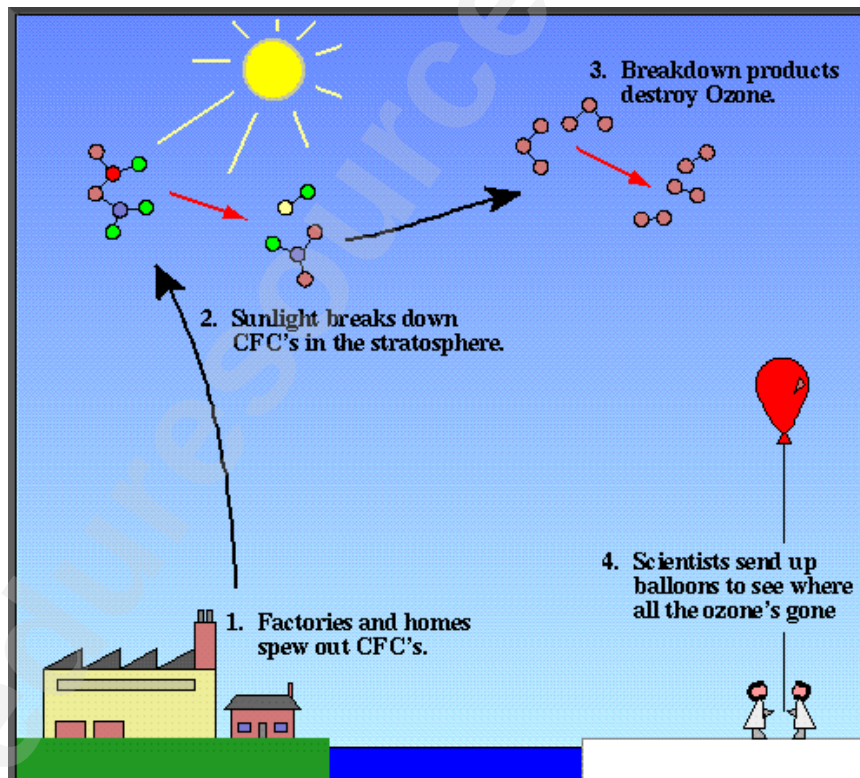
10 Tips for Reducing you Carbon Footprint

-
1. Carpooling at least once a week.
 2. Go one week without using disposable cups given to you at coffee shops.
 3. Try turning off the lights in an empty room at home or in your dorm.
 4. Instead of eating lunch on campus try packing a waste-free (meaning no plastic) lunch.
 5. Unplug your computer every night for one month if you have a computer.
 6. Use only cold water to do your laundry for one month.
 7. Try skipping a trip to the store and shop online.
 8. Try reducing your printing a little bit each day and only print what is absolutely necessary.
 9. Cut your shower time by two minutes for one month.
 10. Reduce your bottled water consumption for seven days.

Causes and Consequences of Ozone Depletion



Ozone Depletion



Water Availability and Water Quality

Factors influencing the availability of water

- Construction of dams
- Destruction of wetlands
- Exotic plantations and depletion of the water table
- Water wastage
- Cost of water
- Poor farming practices
- Droughts and floods
- Boreholes and its effects on aquifers

Factors reducing the quality of water

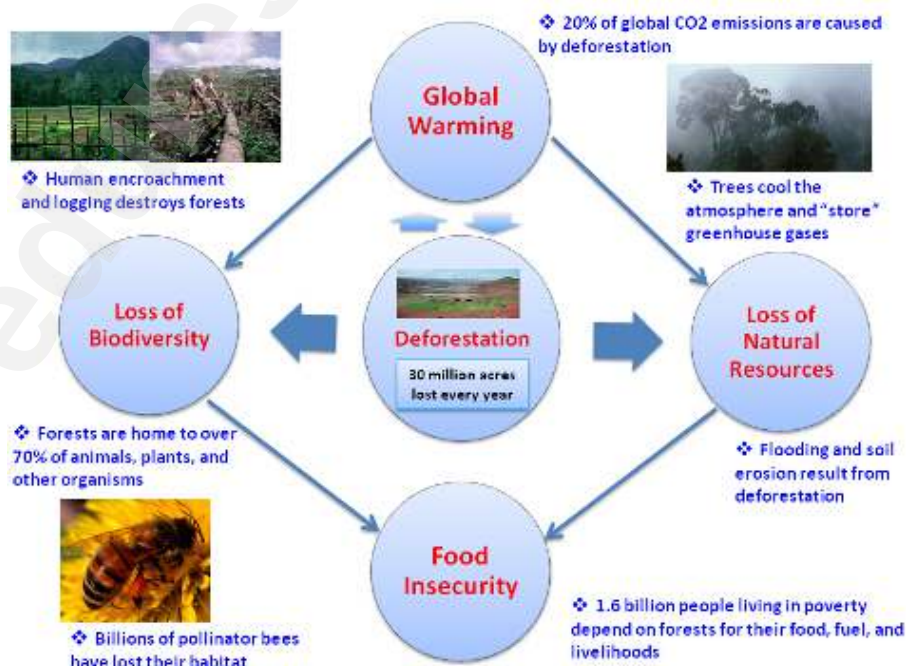
- Eutrophication and algal bloom
- Thermal pollution
- Domestic use, industry, agriculture leading to pollution and disease
- Mining
- Alien plants, e.g. Eichornia

Food Security

The four main components of food security

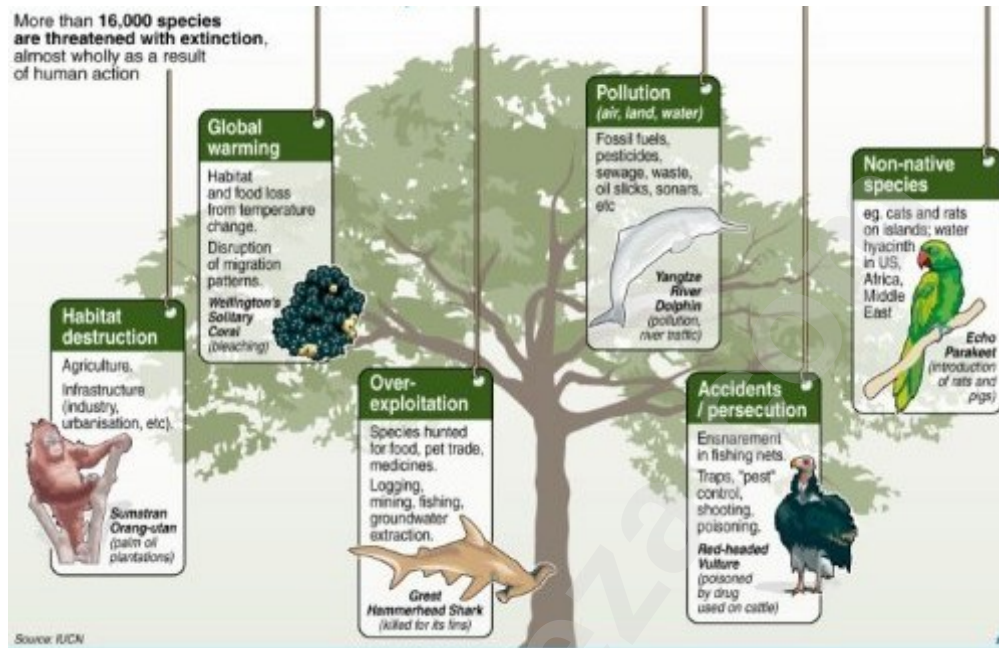


Factors influencing food security



Biodiversity

Main causes of biodiversity loss



Solid Waste Management





Test Yourself

Select the most correct answer from the options given. Write down only the correct letter

Question 1

What is global warming?

- A an increase in Earth's average surface temperature
- B a decrease in the amount of deforestation
- C an increase in the concentration of ozone
- D a decrease in Earth's average surface temperature

Question 2

Which is NOT an effect of increased urbanization?

- A decrease of wetlands
- B increasing volumes of solid waste
- C increase of flooding
- D increase of natural habitats

Question 3

What is the removal of trees without adequate replanting?

- A a monoculture
- B a carrying capacity
- C bioremediation
- D deforestation

Question 4

The following steps occur during eutrophication:

1. Aquatic algae grow rapidly
2. Bacteria use up oxygen
3. Excess nitrate and phosphate discharged into the river
4. Dead algae decomposed by bacteria
5. Fish die of suffocation

The correct order in which eutrophication occurs is ...

- A 3 → 4 → 1 → 5 → 2
- B 5 → 3 → 2 → 4 → 1
- C 5 → 2 → 3 → 1 → 4
- D 3 → 1 → 4 → 2 → 5

Question 5

Deforestation would most immediately result in

- A the disappearance of native species
- B industrialization of an area
- C global warming
- D the depletion of the ozone shield

Question 6

Indicate whether each of the statements in COLUMN I applies to **A only**, **B only**, **both A and B** or **none** of the items in COLUMN II. Write **A only**, **B only**, **both A and B** or **none** next to the question number.

COLUMN I		COLUMN II
1	Waste that cannot be broken down by decomposers	A: Non sustainable waste B: Non bio-degradable waste
2	Land area that is saturated with water, either permanently or seasonally,	A: Wetland B: Aquifer
3	Factors affecting water availability	A: Poor farming practices B: Destruction of wetlands
4.	Factors leading to food insecurity	A: Wastage B: Alien plant invasion

Question 7

Give the correct **biological term** for each of the following descriptions. Write only the **term** next to the relevant question number.

- 7.1 A process by which nutrients become highly concentrated in a body of water, leading to increased growth of organisms such as algae
- 7.2 The term used to indicate the variety of living organisms on earth
- 7.3 Carbon-based minerals such as oil and coal which release heat energy during combustion
- 7.4 The use of resources in such a way that they are still available for future generations



Improve your Skills

Question 1

Read the extract below before answering the questions that follow.

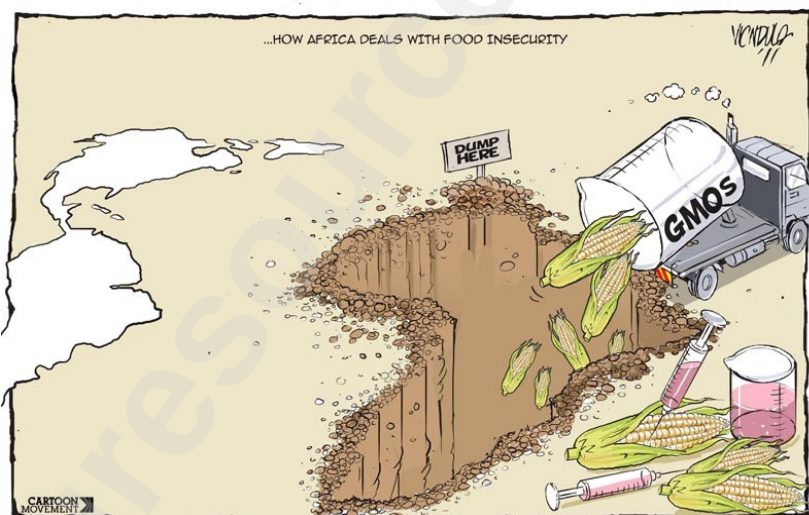
The right of access to food is included in section 27 of the South African Constitution. The Constitution obliges the state to provide legislation and other supporting measures to ensure that all citizens are able to meet their basic food needs. The strategic framework for action to achieve food security was first outlined in the RDP in 1994 which identified food security as a basic human need. In 2000 the cabinet decided to launch an updated national food security strategy to streamline, harmonise and integrate diverse food security sub-programmes in South Africa into the Integrated Food Security Strategy.

- 1.1 Define the term *food security*. (2)
- 1.2 What does the abbreviation RDP stand for? (2)
- 1.3 Name TWO factors that contribute to food insecurity in South Africa. (4)
- 1.4 Name THREE farming practices that compromise food security. (4)

Question 2

(Adapted from March 2013 P2 version 2)

Study the cartoon and answer the questions that follow:



- 2.1 What is the cartoon implying regarding GMO's in Africa (1)
- 2.2 Briefly discuss the role that genetically modified food could play in ensuring food security in South Africa. (3)
- 2.3 Genetically modified crops are seen by many as a solution to food insecurity. Tabulate THREE advantages and disadvantages of using genetically modified crops. (7)
- 2.4 Study the following table and answer the questions that follow:

Dam	Full supply capacity (x10 ⁶ m ³)	River
Bloemhof	1 264	Orange
Vanderkloof	3 171	Orange
Sterkfontein	2 616	Nuwejaarspruit
Nuwejaarspruit Vaal	2 603	Vaal
Pongolapoort	2 445	Pongolo
Gariiep	5 341	Vaal

- 2.4.1 Name the dam that has the largest capacity from the table above. (1)
- 2.4.2 Calculate the difference in the capacity of the second largest dam and the smallest dam. Show your working. (3)

Question 3

(Adapted from March 2010 P2)

- 3.1 The table below shows how the yield of grass varies when different amounts of nitrate fertiliser are added to the crop.

Amount of nitrate fertiliser added to crop (kg/hectare)	Yield of grass (100 kg/hectare)
0	8
225	14
425	18
650	20
700	20
750	19

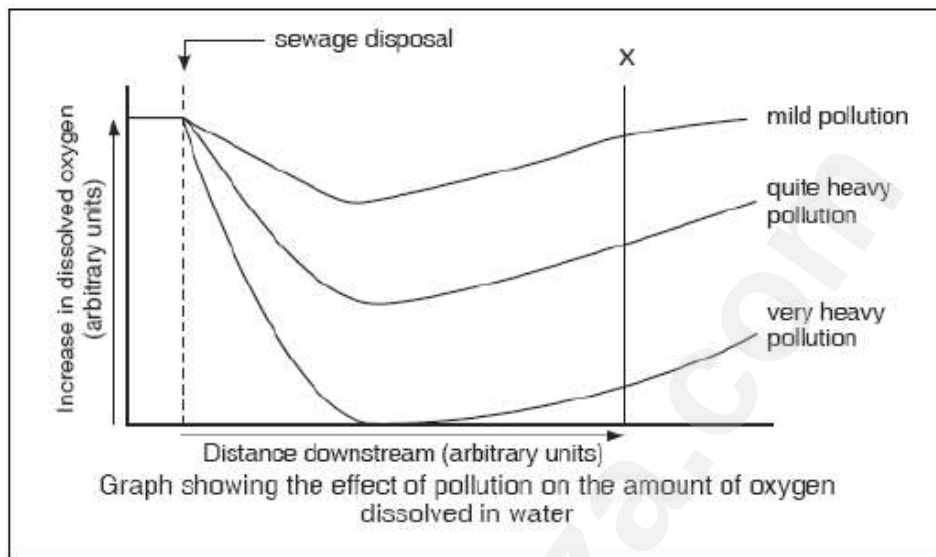
- 3.1.1 Give ONE reason why farmers use fertiliser. (1)
- 3.1.2 What was the yield (100 kg/hectare) of grass when 225 kg of nitrate fertiliser was added? (1)
- 3.1.3 Use the table to determine the minimum amount of fertiliser that has to be added to the grass crop in order to achieve maximum yield. (2)
- 3.1.4 Describe the relationship between the amount of fertiliser added and the yield of grass. (3)
- 3.1.5 Explain why fertilisers should not be added to the soil immediately before and during the rainy season. (2)
- 3.1.6 Describe the effect of the excessive use of nitrate fertilisers on rivers, dams and lakes. (6)
- 3.2 Deforestation is the destruction of forests by the removal of trees in large numbers. The table below shows statistics related to deforestation in different regions from the years 1990 to 2000.

Region	Total land area (ha)	Total forest cover (ha)	Forest cover (%)	Deforestation rate 1990 – 2000 (%)
Africa	2 978 394	649 866	21.8	0.8
Asia	3 084 746	547 793	X	0.1
North and Central America	2 136 966	549 304	25.7	0.1
Oceania and Australia	849 096	197 623	23.3	0.2

- 3.2.1 Which region had the highest rate of deforestation in the 10 year period? (1)
- 3.2.2 Calculate the forest cover (%) of Asia indicated as X. Show all working. (3)
- 3.2.3 List any TWO reasons for deforestation. (2)
- 3.2.4 Describe TWO consequences that deforestation has on the ecosystem. (4)
- 3.2.5 Explain THREE management strategies to reduce deforestation. (6)

Question 4

The graph below shows how different amounts of sewage that are discharged into a river have an effect on the amounts of dissolved oxygen in water. Study it and answer the questions that follow:



- 4.1 Why does the sewage discharge cause the oxygen level to decrease? (2)
- 4.2 Why does the minimum amount of oxygen occur some distance below the point of sewage discharge? (2)
- 4.3 Why does the level of dissolved oxygen in the river increase further downstream? (2)
- 4.4 What TWO possible reasons could there be for sewage being disposed into river systems in a developing urban environment? (4)
- 4.5 Name one positive and one negative effect that "quite heavy pollution" could have on a rural farming community that live at point X down the river. (2)
- 4.6 Explain FOUR strategies you would use to manage solid waste if you were appointed as the head of the waste disposal division of your town/city.