CHAPTER # 16

MAN AND HIS ENVIRONMENT

Q1. Define environment?

Ans: Environment:

The sum total of physical (abiotic) and biotic conditions which influence the organism.

Every organism has its specific surrounding or environment with which it continuously interacts and remains fully adapted. An organism's environment is the sum of physical (abiotic) and biological (biotic) conditions which influence that organism.

Q2. Define Ecology.

Ans: Ecology:

The study of the interrelationship between organisms and their environment is called ecology.

Q3. What are the different levels of ecological organization?

Ans: See Q # 1 from Exercise (Short Questions).

Recalling

A species is a group of organisms which can interbreed freely in nature, to produce fertile offspring

Q4. Define ecosystem and its components.

Ans: See Q #2 from Exercise (Short Questions)

Q5. Explain how biotic components are further classified?

Ans: Classification of Biotic Components:

i. Producers:

The producers are the autotrophs present in an ecosystem Producers include plants, algae and photosynthetic bacteria. These organisms are able to synthesize complex organic compounds (food) from inorganic raw materials Producers form the basis of any ecosystem.

In terrestrial ecosystems, plants are the main producers. In aquatic ecosystems, the main producers are the floating photosynthetic organisms (mainly algae) called phytoplankton and shallow water rooted plants.

ii. Consumers:

The consumers are heterotrophs. They cannot synthesize their food and so depend upon producers for food. Consumers include all animals, fungi, protozoans and many of the bacteria. The animals are the major consumers of ecosystems.

Classification of Consumers:

They are further classified as herbivores and carnivores,

a. Primary Consumers (Herbivores):

Herbivores e.g. cattle, deer, rabbit, grasshopper etc. feed on plants. They are the primary consumers. They feed directly on plants or products of plants

b. Secondary Consumers (Carnivores):

Carnivores feed on other animals. Primary carnivores (secondary consumers) feed on herbivores, Fox, frog, predatory birds, many fishes and snakes etc. are primary carnivores

c. Tertiary Consumers (Secondary carnivores):

Secondary carnivores (tertiary consumers) feed on primary carnivores. Wolf and owl etc. are secondary carnivores. Tertiary carnivores e.g. lion, tiger etc feed on secondary carnivores

iii. Decomposers or reducers:

Decomposers or reducers break down the complex organic compounds of dead matter of plants and animals) into simple compounds They secrete digestive enzymes into dead and decaying plant and animal remains to digest the organic material. After digestion, decomposers absorb the products for their own use. The remaining substances are added to environment. Many types of bacteria and fungi are the principal decomposers of biosphere.

Q6. Write note on biosphere.

Ans: Biosphere:

The last level of ecological organization, all the ecosystems of the world together form the biosphere

All ecosystems of the world together form the biosphere. It includes all the ecosystems of the planet Earth. In other words, the biosphere consists of all organisms present on the Earth and all regions of the Earth where they live Biosphere ranges from the floor of oceans to the tops of the highest mountains. It is about 20 kilometers thick.

Note:

The biosphere makes a thin layer surrounding the planet Earth If you consider the Earth as of the size of an apple, then the biosphere will be as thick as the apple's skin

Recalling

Omnivores are the consumers that eat animal flesh as well as plants and plant products.

Examples of omnivores:

Bears, Coatis, Hedgehogs, Opossums, Pigs, Humans, Mice, Rats and Squirrels Various birds (whose prey can consist of berries and nectar to insects, worms' fish small rodents and snakes) etc.

Interesting Information

Tertiary carnivores/ top carnivores:

Tertiary carnivores are not eaten by any other animals. They are also called top carnivores.

The minerals, which are released by decomposers, are used as nutrients by the producers.

Q7. How the flow of energy is different from that of materials?

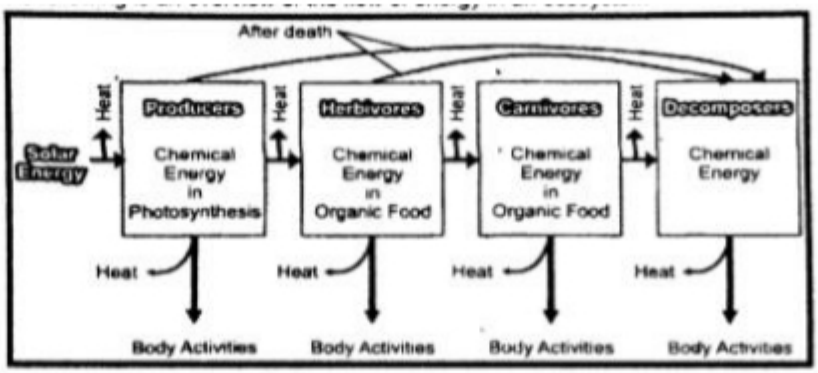
Ans: See Q # 3 from exercise (Short Questions)

Q8. Explain flow of energy in an ecosystem.

Ans: Flow of Energy in Ecosystem:

The flow of energy in different trophic levels of ecosystem is unidirectional.

The following is an overview of the flow of energy in an ecosystem.



Energy flow in an ecosystem

Sun is the primary source of energy:

The Sun is the primary source of energy for all ecosystems Producers get solar energy and transform it into chemical energy by the process of photosynthesis They store this energy in their tissues and also transform it into mechanical and heat energy during their metabolic activities

Flow of energy in producers:

The energy in producers' tissues flows to herbivores when producers are eaten Herbivores transform it into mechanical and heat energy during their metabolic activities and store the rest in their tissues Carnivores eat herbivores and get energy. They also use it for their body activities and store the rest in their tissues. After the death of producers and consumers, the energy stored in their tissues is used by decomposers.

Law of Thermodynamics:

The storage and expenditure of energy in an ecosystem is in according with the basic law of thermodynamics i.e. 'energy can neither be created you destroyed but can be transformed from one form into another

Note: In an ecosystem there is

i. Constant flow or transfer of energy from the Sun through producers to consumers and decomposers

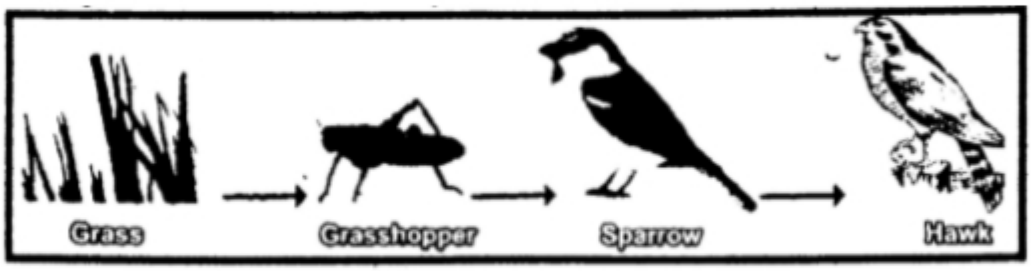
ii. A significant decrease in useful energy during transfer of energy at each trophic level

Q9. Explain flow of materials in an ecosystem.

Ans: Flow of Materials:

The materials flow from one trophic level to the next by means of food chains and food webs

A food chain is a series of organisms within an ecosystem, in which each organism feeds on the one before it and is fed by the one after it. For example following is a food chain in an ecosystem



A simple food chain

The base of food chain is always formed by a plant (producer). It is eaten by a primary consumer which is preyed upon by a secondary consumer. The secondary consumer may be eaten by a tertiary consumer

A food chain, can therefore, be represented as

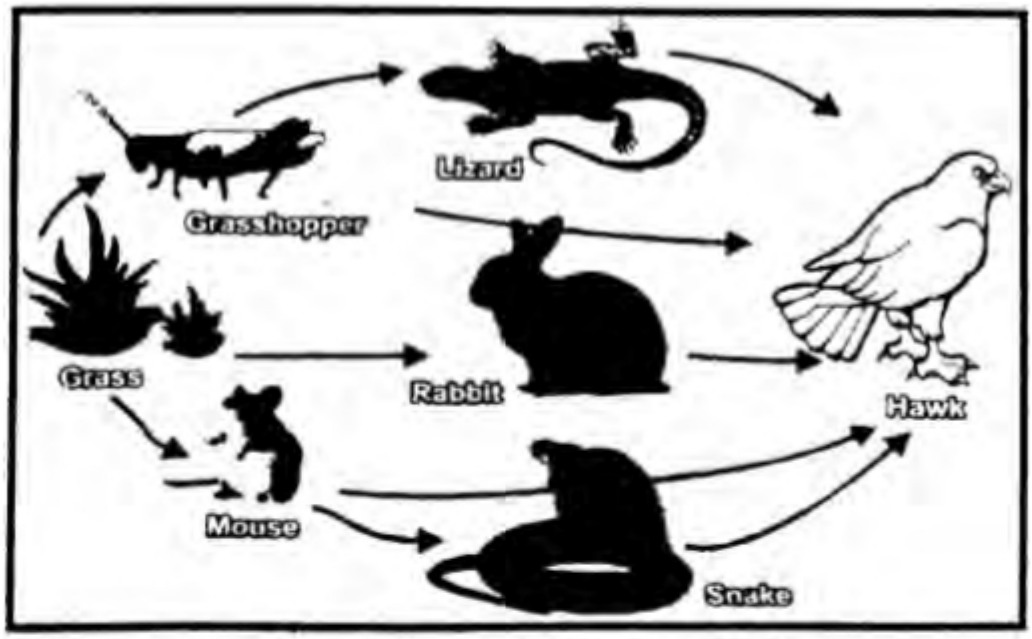
Producer- Primary Consumer - Secondary Consumer - Tertiary Consumer

A food chain involves a nutritive interaction among the biotic components of an ecosystem Usually there are 4 or 5 trophic levels Shorter food chains provide greater available energy and vice-versa

Food web:

In nature, food chains are very complex as one organism may be the food source of many other organisms. Thus, instead of a simple linear food

chain, there is a web-like structure formed by these interlinked food chains. Such interconnected food chains collectively make 'food web' Food web can be defined as "a network of food chains which are interconnected at various trophic levels



A food web in grassland ecosystem

Q10. How would you describe the ecological pyramids?

Ans: Ecological pyramids:

In 1927, Charles Elton (an English ecologist) developed the concept of ecological pyramids. He noted that the animals present at the beginning of food chain are abundant in number while the animals present at the end of food chain are fewer in number. Ecological pyramid can be defined as, "A representation of the number of individuals or amount of biomass or energy present in various trophic levels of a food chain".

Types of Ecological pyramids:

Ecological pyramids are of three types.

i. Pyramid of Numbers **ii.** Pyramid of Biomass

iii. The Pyramid of Energy

Q11. Explain what you mean by the pyramids of number and biomass.

Ans: See Q# 1 from Exercise (Understanding the Concept).

Q12. Define Biomass?

Ans: The total amount of living or organic matter in an ecosystem at any time is called "biomass"

Q13. How would you describe biogeochemical cycles?

Ans: Biogeochemical Cycles:

Biogeochemical cycles are the cyclic pathways through which materials move from environment to organisms and back to environment.

Environment is the source of materials for all living organisms. Environment provides bioelements which are used by organisms for their bodies and metabolism. The materials are continuously recycled between organisms and environment.

Carbon cycle:

The biogeochemical cycle in which carbon flows between organisms and the environment

Nitrogen cycle:

The flow of nitrogen between environment and the organisms

Nutrient Cycles:

Increase in the temperature of the Earth, due to the addition of greenhouse gases in atmosphere, which do not allow solar radiations to reflect back into the space.

The addition of greenhouse gases (e.g., carbon dioxide, methane, ozone) in atmosphere increases the temperature of the Earth. These gases remain in the lowest part of Earth's atmosphere and do not allow solar radiations to reflect back into space. As a result, heat remains within the Earth's atmosphere and increases its temperature. This is called global warming

Effects of Global Warming:

Due to global warming, polar ice-caps and glaciers are melting faster than the time taken for new ice layers to form. Sea water is also expanding causing sea levels to rise. Due to melting glaciers, rivers overflow and cause floods

Interesting Information (IPCC)

In 1990 United Nation established intergovernmental Panel on Climate Change (IPCC). It provides scientific advice to the world leaders on issues like the build-up of greenhouse gases and its prevention According to IPCC, Earth's surf, temperature has increased - 02°C per decade in the past 30 years.

The Maldives Survival

Scientists fear that the sea level is rising up to 0.9cm a year Rise in sea level has worst effects on coastal countries. Most of the islands of the Maldives are less than 1 metre above sea level. It is estimated that within 100 years, the Maldives might become uninhabitable and the citizens would be forced to evacuate

Q22. Write a note on Greenhouse Effect.

Ans: Greenhouse Effect:

The term 'Greenhouse Effect refers to the phenomenon in which certain gases (called greenhouse gases) trap heat in the atmosphere. These gases act like the glass in a greenhouse, which does not allow the inner heat to escape When Sunlight reaches the surface of the Earth much of its energy is transformed into heat energy The Earth surface reflects this heat energy towards space as infrared radiation

The greenhouse gases trap infrared radiation and send it back to Earth Carbon dioxide methane and nitrous oxide are important greenhouse gases Since 1800, the amount of Carbon dioxide in atmosphere has increased 30%. The amount of methane has more than doubled and the amount of nitrous oxide increased about 8%

Q23. Write a note on Acid Rains. Highlight Some of the significant Ill effects of acid rain.

Ans: Acid Rains:

When rain falls through polluted air it comes across chemicals such as oxides of sulphur and nitrogen These chemicals interact with water vapours in the presence of sunlight to form sulphuric acid and nitric acid. These acids remain as vapour at high temperatures.

As temperature falls, the acids begin to condense into liquid form and mix with rain or snow, on the way down to the Earth This makes rain acidic with pH range of 3 to 6.

Some of the significant ill effects of acid rain are:

i. Acid rain destroys the necessary nutrients present in the waters of rivers and lakes etc Its also lowers the pH of water. Most of the aquatic animals cannot survive at this pH
ii. Acid rain washes nutrients out of soil damages the bark and leaves of trees and harms root hairs Leaf pigments (chlorophyll) are also destroyed
iii. Metallic surfaces exposed to acid rain are easily corroded Fabrics paper and leather products lose their material strength or disintegrate easily
iv. Building materials such as limestone, marble, dolomite, mortar and slate are weakened with acid rains because of the formation of soluble compounds

Thus, acid rain is dangerous for historical monuments. The building of famous Taj Mahal has been corroded at many places due to acid rains

Taj Mahal and its corroded door

Q24. Write a note on Deforestation.

Ans: Deforestation:

Deforestation means cleaning of forests by natural causes or humans Large areas of forests have been cleaned for agriculture, factories, roads, rail tracks and Humans cut trees for getting wood (lumber), which is then used for making structures and for heat production Human preys upon forest animals, which are the predators of many insect pests in this way, insect pests destroy forests by eating the shoots and spreading diseases

Effects of deforestation:

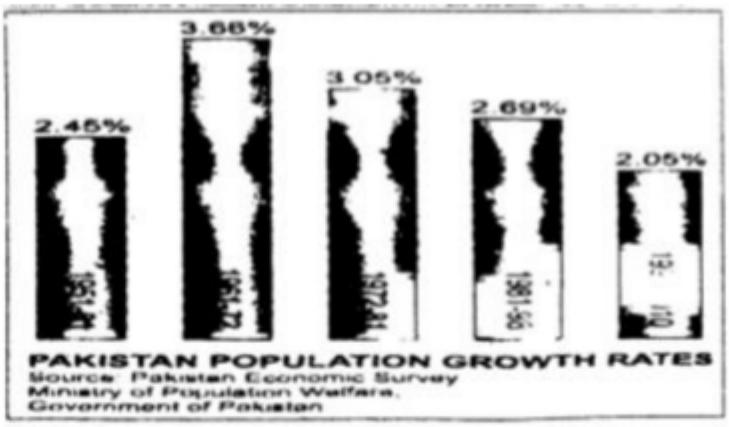
The effects of deforestation include floods, droughts, landslides and soil erosions, global warming and loss of habitat of many species.

Q25. Write a note on Overpopulation.

Ans: Overpopulation:

When the industrial revolution started some 250 years ago, the world population was at 600 million - that seems like a lot of people but now the world population is almost ten times at 6 billion and will grow to 8 billion by 2025. Better health facilities and lowered mortality rates have contributed in population growth

Year	Population	Year	Population
1981	85,096,000	1999	134,790,000
1984	92,284,301	2002	144,902,409
1987	99,953,232	2005	155,772,000
1990	107,975,060	2008	166,111,487
1993	166,444,165	2009	169,708,303
1996	125,409,851	2010	173,510,000
THE POPULATION OF PAKISTAN		**Source: The World Bank**	



Q26. Write a note on Urbanization.

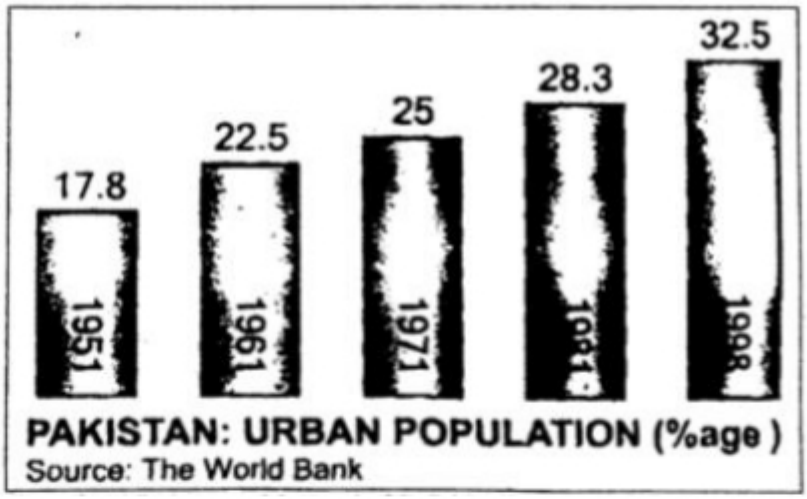
Ans: Urbanization:

Urbanization means growing of cities. People move from rural areas to cities in search of better jobs, education opportunities and higher standards of living. If there is rapid urban growth, the governments find it difficult to provide even the basic facilities like health, education, shelter, water, electricity etc. Most of the migrants in cities do not find good jobs and become the part of urban poor. There is overcrowding in schools, hospitals etc.

The slum areas increase in number and people living there are at great risk of diseases. Urbanization is a global problem and cannot be stopped but it can be managed. The current level of urbanization in Pakistan is about 32% which is not high global standards.

Planned urbanization:

A planned urbanization can solve many problems. The cities should have thick green belts in their surroundings to control pollution. The open spaces in cities should be reserved through zoning and land plans. The urban spread-out should also be controlled.



Utilization of public transport instead of individual transports also proves effective way to manage urbanization.

Q27. Define pollution.

Ans: Pollution:

Pollution is defined as any undesirable change in the physical, chemical or biological characteristics of air, water and land that may harmfully affect living organisms and natural resources.

Q28. Define pollutants.

Ans: Pollutants:

The substances that actually cause pollution are called the pollutants. They may be the industrial effluents, domestic wastes, medical wastes etc. Pollutants are of two types i.e. biodegradable and non-biodegradable.

Q29. Write note on the causes and effects of the air and water pollutions.

Ans: See Q #6 from Exercise (Understanding the Concept)

Q30. Write a note on causes and control of Land Pollution.

Ans: Land Pollution:

Land (soil) is an important resource as it is the basis for the growth of producers. In the recent times, soil has been subjected to pollution.

Causes of Land Pollution:

The pesticides used in agriculture have chemicals that stay in soil for long times. The acid rains change the pH of soil making it unsuitable for cultivation. The household and other city garbage lies scattered in soil in the absence of a proper disposal system. Materials like polythene block the passage of water into soil and so decrease the water-holding capacity of soil.

Many industries produce harmful chemicals which are disposed of without being treated. Improper disposal of nuclear wastes also causes radioactive substances to remain in soil for a long time. Open latrines in villages and some parts of cities are also the source of land pollution.

Control of Land Pollution:

There should be suitable and safe disposal of wastes including nuclear wastes.

Non-biodegradable materials like plastic, glass, metals etc. should be recovered and recycled Inorganic pesticides should be replaced by organic pesticides.

Q31. What do you mean by conservation of nature?

Ans: Conservation of Nature:

Conservation of nature means the conservation of natural resources. Everything that we use or consume e.g., food, petrol etc. is obtained from natural resources. The renewable natural resources e.g., air are reproduced

easily but the non-renewable resources (e.g. minerals and fossil fuels) are not replenished once they get depleted. We have to conserve the non-renewable resources because their reserves are limited and humans are heavily dependent on them for daily needs. The renewable resources too have to be judiciously used. To ensure sustainable use of resources in our environment, we should act upon the principle of. The 3R'ie, Reduce, Reuse, and Recycle.

Interesting Information

Unwanted, unpleasant and annoying ids are termed as noise. Noise is considered as a form of pollution. Immediate effects of noise pollution are annoyance and aggression and the long-term effects are hearing loss, depression hypertension etc.

Interesting Information

According to estimates, at the current of increase, the average global temperature will go up by 3°C to 8°C in the next 100 years

Interesting Information

There are more than 200 tanneries (Industry where raw skin is treated to make leather) operating in Kasur city. The industry discharges 9000 cubic meters of waste water daily into the nearby water bodies This water contains heavy metals and becomes a part of the underground water. In 2003. a survey showed that two thirds of residents and 72 percent of tannery workers suffered cancer infections of the kidney or loss of eyesight Tests showed that the drinking water was contaminated with lead. mercury and chromium.

Interesting Information

The Pakistan government and the United Nations Development Programme (UNDP) launched the Kasur Tannery Pollution Control Project. The project has established an effluent treatment plant, chromium plant and a solid waste disposal site.

Q32. What do you mean by the concept of 3Rs with reference to the conservation of natural resources?

Ans: See Q# 5 from Exercise (Short Questions).

Q33. Highlight the different plans for the Conservation of Nature in Pakistan.

Ans: Plans for the Conservation of Nature:

i. In 1992 Pakistan developed and the National Conservation Strategy The main objectives of the strategy are conservation of natural resources and improved efficiency in the use of resources. It also covers the policies for promoting efficiency and conservation of energy resources

The Federal Ministry of Environment has launched the National Drinking Water and Sanitation Policy. It focuses on the provision of clean drinking water to entire population and the conservation of water resources Water purification plants are being installed all over the country

ii. In 2006 the UNDP launched the project "Mass Awareness for Water Conservation and Management" The objective of the project was to launch a comprehensive awareness campaign for the conservation and management of water resources in Pakistan

iii. The organization SCOPE (Society for Conservation and Protection of Environment) works with government for mass awareness and research for the conservation of natural resources in Pakistan.

iv. The WWF (old name is World Wildlife Fund but now it is called World Wide Fund for Nature) is working on many projects related to the conservation of nature

Q34. What are the different programmes of WWF-Pakistan:

Ans: Programmes of WWF-Pakistan:

The following are some important programmes of WWF-Pakistan in collaboration with the government of Pakistan)

i. Improving sub-watershed management and environmental awareness around Ayubia National Park

ii. Plantation of the trees of Jatropha and Mangroves at District Thatta. Sindh.

iii. District-wise forest cover assessment of Pakistan

iv. Saving Wetlands Sky High Programme (for the conservation and management of high-altitude wetlands)

v. Indus Basin Water Security Project (to protect the water-flow needed for the maintenance of river ecosystem and for the benefit of nearby areas)

vi. Regional Climate Risk Reduction in Himalayas.

Interesting Information

Clean water, air, fuels, agricultural land and forests appeared to be plentiful earlier, but now these are becoming scrape. If we continue depicting

them like this, we will be creating untold misery for ourselves and for our future generations

Interesting Information

A recycling of one tonne of paper can save 17 trees

Interesting Information

We can add the R4 i.e. Reforest. Trees should be planted during the rains Trees make our environment more cool, shady and green

Q35. Briefly describe the basic information about dengue fever.

Ans: Basic information about dengue fever:

Dengue fever is a viral infection transmitted through a mosquito Aedej aegypti. It has become a major health problem in tropical and sub-tropical countries including Pakistan. There are four types of dengue virus Recovery from infection by one provides lifelong immunity against that virus but provides no protection against infection by the other three viruses. According to the World Health Organization, there are 50 million dengue infections worldwide every ear. Now there are 25 billion people at risk from dengue.

The female Aedes mosquito gets the virus when it bites PH infected person When an infected mosquito bites another person, viruses enter his/her blood and attack white blood cells. Inside WBCs, viruses reproduce and destroy them in severe cases, the virus affects liver and bone marrow. As a result there is a decrease in the production of blood platelets and patient suffers from bleeding Other symptoms of dengue include high fever severe headache pain behind the eyes, muscle and joint pains and rash

Sometimes, dengue fever converts into dengue hemorrhagic fever (DH) or into dengue shock syndrome (DSS). DHF results in bleeding low levels of blood platelets and blood plasma leakage In DS3 the bloc pressure falls dangerously low.

There is no vaccine or treatment for dengue fever. At present, the only method of controlling dengue virus transmission is to check the spread of Aedes mosquitoes.

Aedes aegypti breeds primarily in the containers used for water storage, discarded plastic containers, used automobile tyres and other items that collect rainwater. The mosquitoes can be controlled through proper solid waste disposal and improved water storage practices Small fish and crustaceans have also been used for killing the larvae of the mosquito. Insecticide sprays have not proved efficient in killing the mosquitoes, because spray does not penetrate all habitats of adult mosquitoes.