

13 Artificial Environment and Green Concept

13.1 Artificial environment and green concept

Pay your attention to figure 13.1 which indicates built environments you have learnt in the chapter Bio-diversity.



Agricultural environment

Industrial environment

Urban environment

Figure 13.1

From the date of the origin of Earth, everything in it has been formed naturally. However with the advent of man on Earth and passage of time thereafter, an artificial environment or a built environment was taken place on the natural environment because of the man who changed the natural environment according to his requirements. Therefore, agricultural, industrial and urban environments are artificial environments made by man.



Assignment 13.1

- Figure 13.2 indicates how the area around Manhattan metropolis of New York in United State of America appeared in the past and is seen at present.
- List favourable and unfavourable features between these two environments.



Figure 13.2 - Town Manhattan

Instead of the Earth covered with green colour in the past, what is left today is an artificial environment crammed with settlements, factories and cultivated lands. Because of this, at present the humans all over the world are facing unsolve problems. Along with the advancement of science and technology of the human who is considered as the dominant living being on Earth, his/her life span too

has increased. Meanwhile, with the increase in human population and unlimited exploitation of limited resources on Earth, all organisms have confronted with many problems. Increase in global warming due to human activities has either directly or indirectly become the reason for all environmental problems.

At present, human attention has been drawn to follow guidelines and policies essential for maintaining goods and services without damaging the natural environment or causing minimal damage to the natural environment on the Earth. This has come to limelight as the green concept.

Green concept means, following guidelines and policies essential for maintaining goods and services so that the natural environment on Earth is minimally harmed or not harmed at all.

To get a better understanding about the green concept, let us find out information on several places in the world which adopt the green concept.

German Parliamentary building

Energy for this building is obtained from solar energy, geothermal energy and bio-fuel power houses. In addition, it has special ventilating devices and contrivances to retain warmth. 80% of the total electricity requirement is produced within the building itself. Because of such devices, it has reduced the annual emission of carbon dioxide from 7 000 tons to 1 000 tons (figure 13.3).



Figure 13.3 - German Parliamentary building



Figure 13.4 - Beijing National sports complex

Beijing National sports complex in China

It has employed methods to obtain electricity from solar energy and water requirements from rain water. Ventilation is effected naturally. Therefore, the maintenance of the sports complex is carried out by low cost (figure 13.4).



Figure 13.5 - Wayne L. Morse court complex

Wayne L. Morse court complex in USA

Irrigation required for plants is minimized by growing plants which can withstand drought conditions. Use of water has been cut down by 40% by the installation of waterless urinals, toilets and showers which use water minimally (figure 13.5).

K2 Housing project in Australia

This housing complex utilizes renewable energy only. Use of recycled timber, rain water, solar water heaters and photovoltaic panels can be seen in this. By such measures, it has been able to reduce electrical supply by 55%, water supply by 53% and petroleum gas supply by 46% (figure 13.6).



Figure 13.6 - K2 housing project

Bud Clark Commons housing complex in USA

This housing complex uses solar water heaters to get hot water, a roof with a plant cover absorbing heat and rain water, devices to purify bathroom effluents to be used in toilets and fiberglass windows opening under hot conditions. This project saves energy worth of 60 000 US dollars annually (figure 13.7).



Figure 13.7 - Bud Clark Commons housing complex



Figure 13.8 - Symbol of the Green Concept

You should not misunderstand that the aim of green concept is only enhancing the plant cover to appear in green. It may be quite clear to you from the above examples. Minimizing the emission of greenhouse gases (carbon dioxide, methane, nitrous oxide etc.) that cause increase in global warming is also a major aim of the green concept. Therefore, all processes supporting it belong to the green concept. Let us examine how the present agricultural and industrial processes can be geared for this.

13.2 Agricultural Process

Organic farming

The production process that promotes the wellbeing of the agricultural environmental system, microbial activity in soil, bio-diversity and biological cycles is called **organic farming**.

Use of organic fertilizers can be given as a major aspect of organic farming. As the harvest that flourishes by absorbing nutrients from the soil of the cultivated land is removed from it, the soil becomes deficient in nutrients. Therefore, the soil should be supplied with nutrients from outside. It is done by applying fertilizers, containing artificially prepared minerals and artificially synthesized chemicals, which are being applied more and more. But, instead of this, organic fertilizers such as compost formed by subjecting plant or animal materials to natural processes can be applied. Some facts regarding the importance of the use of organic fertilizers rather than inorganic fertilizers can be listed as follows.

- Application of inorganic fertilizers destroy many micro-organisms and macro-organisms such as earthworms which are helpful for the crop. It affects existence of the natural environment badly.
- Excessive application of inorganic fertilizers affects human health through plant products. Some heavy metals contained in, enter the human body giving rise to unfavourable effects.
- Organic fertilizers add nutrients falling within a wide range whereas inorganic fertilizers can provide only a few nutrients such as nitrogen, phosphorus, potassium and sulphur.
- Large amount of money need not to be spent for organic fertilizers. Fertilizers can be produced ourselves using refuse such as straw, plant debris, chaff and saw dust.
- There is a greater demand for rice, vegetables, fruits and leafy vegetables obtained from organic farming among the discerning people in Sri Lanka. Therefore, the farmers growing them as well as the traders who sell them can have a higher income.
- The structure of the soil will be improved with the time by using organic fertilizer.

Another fact of organic farming is the use of traditional agricultural practices for pest control. The pesticides used at present are highly poisonous chemicals that are synthesized artificially. Weedicides, insecticides and fungicides belong to them. Use of these pesticides causes inestimable environmental degradation and it can be prevented by employing traditional agricultural practices. These may be biological methods, mechanical methods or religious rituals. Some traditional agricultural practices used for pest control are given below.

- Spread other organisms that destroy eggs and larvae of pests
- Control pests using insect-repelling substances
(‘Dahaspethiya’ flowers/‘Sevvandipoo’, juice of neem seeds, plants of citrus family)
- Water management (restrict water or excess water) to control pests

- In order to protect the cultivated land from harmful insects, an oil lamp is lighted in the land at night. Then the insects attracted to the flame are caught by it and die. Hence, this is known as a light trap.
- After sowing seed paddy in a paddy field, a 'diya holmana' is made below the 'vakkada' (overflow) to protect them from birds. Because of the sound it produces, the birds fly away.
- To protect paddy in a paddy field from mice, sticks each tied with a coconut husk are planted in several places in the paddy fields. Then, the birds such as owls perch on them and hunt the mice.
- Crop rotation avoid the establishment of pests in the crop land.



Assignment 13.2

Collect information about the traditional agricultural practices used for pest control either by consulting elders or electronic/print media and prepare a booklet.

As the side effects of present day agricultural practices carried out neglecting the traditional knowledge descended for long about farming in Sri Lankan society and without modern scientific knowledge farmers have to face tragedies like the chronic kidney disease. In addition to that, diseases such as dermatitis and neuro diseases are common.

Water management

"Let us not drain even a single drop of water falling from the sky into the sea without being used" declared so in the past by king 'Parakramabahu' the Great, was the importance of water management. We are the one and the only nation that did an environment friendly water management for agriculture from the past. Tanks, dams and irrigation canals which give supreme contribution to sustain lives of millions of people from thousands of years back to date, are magnificent examples for rain water conservation (figure 13.9 (a)).



Figure 13.9 (a) – 'Parakrama samudraya'

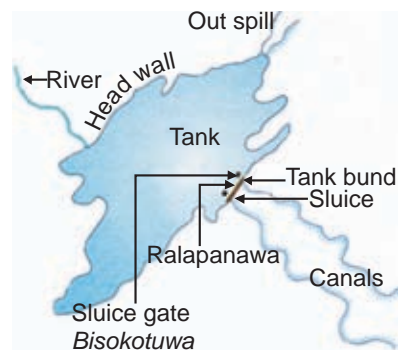


Figure 13.9 (b) – Major parts of a tank

A reservoir of water made by erecting a dam across a river, stream (oya) or a tributary of them with the aim of irrigating for farming an area which is short of water supply is used in earlier times.

Low level areas in large flat areas are made into tank systems where rain water got stored. These tanks are connected where rain water get collected and flow into nearby tanks. The stored water is used in dry zones during whole year. A tank is a system full of the green concept. This is confirmed by considering the components of a common plan of a tank (figure 13.9 (b)).

Collecting of rain water

As an individual person, there are courses of action which we can take to conserve rain water. One such measure is utilizing rain water falling on the roofs of houses and other buildings, during drought (figure 13.10).



Figure 13.10 – A device set up in a house to collect rain water



Figure 13.11 – Drip irrigation

Drip irrigation

This is the most efficient micro-irrigation method used at present. In this, lateral pipes connected to a main pipeline from the water source are laid closer to the root system of every crop plant. Water drips in the form of droplets from small devices called emitters in these pipes. Since water seeps only to the root system, water is not wasted and the growth of weeds is controlled (figure 13.11).

Land management

Management of use and development of the land resource is known as land management.

Land provides the environment for agriculture. But, when using it there may be favourable as well as unfavourable impacts on the environment. Especially the misuse of land leads to collapse of natural equilibrium including the increase in the emission of greenhouse gases. The reason for this is that if maximum use is not made from the existing land, lands with forests have to be used for cultivations. This causes deforestation, so the green cover is reduced. Therefore, land management should focus the green concept.

Some steps taken in land management are given below.

- Making a soil texture suitable for agriculture
- Improving the soil structure so that water and air are retained well
- Making a good draining system in the land
- Improving the quality of soil by applying fertilizers
- Cultivated better suited crops in respective places in the land.






Figure 13.12 – A managed cultivated land

Indicated below are a few advantages that can be obtained by sustainable management of agricultural lands.

- Improving productivity
- Reducing production risk
- Improving the quality of natural resources, soil and water
- Raising economic value
- Minimizing disasters
- Minimizing effects to the environment

Several green concept centered cultivation methods used in land management for high productivity are given in table 13.1.

Table 13.1

<ul style="list-style-type: none"> ● Mixed crop cultivation 	<p>Cultivating one or more crops along with one main crop in a same plot of land is referred to as mixed crop cultivation. This yields many advantages.</p> <ul style="list-style-type: none"> ● Since nutrients are absorbed in balance from the soil, the quality of soil is conserved. ● Since there are different types of crops, the growth of weeds and damage caused by insect pests are minimized. ● Crops withstand unfavourable climatic conditions and plant diseases are suppressed. ● Increases the total yield ● Affords maximum benefits out of limited resources
<ul style="list-style-type: none"> ● Crop rotation 	<p>In this method, several crops are grown in the same plot of land from season to season according to an order. Mostly in crop rotation, four crops, a cereal, a legume, a yam crop and a commercial vegetable crop are grown.</p> <ul style="list-style-type: none"> ● By growing different types of crops, nutrients in all the soil layers are exploited. ● Different modes of land preparation improves the physical, chemical and biological features of the soil.
<ul style="list-style-type: none"> ● Growing crops improved by bio-technology 	<p>When improving plants by bio-technology, their tolerance to drought and resistance to diseases and pests increase while the nutritive value and taste of plant products also increase.</p> <p>e.g.</p> <ul style="list-style-type: none"> ● Developing high quality varieties of organisms through hybridization ● Developing maize plants resistant to a harmful weevil species ● Producing varieties of rice which are resistant to pests ● Producing a variety of 'Ransahal' containing vitamin A ● Making crop varieties which produce higher yield

Post-harvest technology

Cleaning, classifying and packaging the harvest immediately after harvesting so that its quality is preserved, is known as post-harvest technology (figure 13.13). The post-harvest process includes plucking the harvest, packing the harvest, transporting and selling.

In Sri Lanka, it can be seen that post-harvest technology operates at a very low level. It seems that, in our country people are little interested in plucking, packaging and transporting harvest scientifically. Therefore, a greater part of the harvest is disposed without consumption. This drops the income of the producer as well as the seller while increase the price of the products. Moreover, the opportunity to consume high quality food is reduced due to poor post harvest technology.



Figure 13.13 – Post-harvest arrangements

13.3 Industrial process

Use of chemical substances

We have accustomed to use chemical substances for various needs of our day to day life. They can be indicated as follows.

- Food additives
- Cleaning agents
- Medicines
- Disinfectants
- Cosmetics
- Paints

Most of these chemicals are artificially synthesized substances. Once added to the environment they retain for a long time in the same form. This disturbs the environmental balance. Because of this, we need to minimize the use of these chemical substances as much as possible or use natural substitutes instead of them. Some measures that can be taken in this regard are as follows.

- Avoid the consumption of flavoured food as much as possible and use home prepared natural flavours such as spices instead of artificial flavours.

- Use chemicals such as turmeric and asafoetida which have been used by our ancestors to kill germs.
- Using natural medicinal substances, instead of mercury containing carcinogenic creams available in the market to brighten the skin.

Construction of buildings

The aim of green building concept is to construct buildings with a green environment beset with plants. A few basic principles should be abided by when constructing green buildings. They are;

- Presence of green plants in the premises
- Get clean air through ventilation methods such as doors and windows
- Minimize the amount of waste
- Use energy efficiently
- Consume water efficiently
- Use natural materials for construction
- Make the maintenance cost minimal
- Device to reach natural light

Through the green buildings concept, environmental resources can be consumed causing minimum loss to the environment. Therefore, maximum benefit can be utilized from the nature. Technology also can be used for this.

e.g.

- Minimizing the amount of heat by a plant cover
- Producing electricity by solar cells
- Obtaining hot water to bathrooms from solar heaters
- Fixing large windows to receive more natural light and ventilation



Figure 13.14 – A building constructed according to the green concept

Green transportation

A massive revolution of transporting activities has been taken place with the technological development in modern world. It causes to increase the productivity, efficiency and the comfortable luxuries life pattern. But, unfavourable effects caused due to this development make long term disadvantageous results. Large amount of fuels burn daily for transporting goods and passengers. The result is collecting green house gases such as CO₂ and NO₂ more in the atmosphere.

Vehicles of turbo engines which combust compressed air with petrol, release more NO₂ gas in addition to CO₂. Hence, attention must be paid towards of minimizing the emission of greenhouse gases in transporting activities. This concept is known as green transportation.

e.g.

- Minimizing usage of vehicles individually
- Using transporting methods which do not consume fuels (walking, cycling)
- Aware and facilitate citizens to use hybrid vehicles
- Promote the concept of vehicles using solar cells and electricity among public
- Facilitating, transporting methods through water ways such as streams and rivers

When transporting food and other goods, it burns large amount of fuels that energy consumption is also need to cut down to decrease food miles. Consumption of local food is also need to appreciate. Every individual must take steps to minimize the emission of greenhouse gases in transporting activities so, that every body can contribute to solve global crises.



Assignment 13.3

Make a list of activities that you can engage for green transportation.

Get the ideas and proposals of your friends in classroom, by presenting the list you prepare.

The above discussion reveals us that, man has changed his living environment drastically for his luxurious life by exploitation of limited resources unlimitedly. Other organisms on the Earth has no privilege to use environmental resources as human population, although they live in the same land.

Number of global issues has been arisen from unusual exploitation of natural resources by some people. The serious threaten is global warming. Hence, it is the responsibility of man to avoid every activity which causes the emission of greenhouse gases.

From birth to death, every activity of man cause producing CO_2 . It can be inferred that, there is no human activity which do not cause production of CO_2 . This can be clearly understood by studying 'Carbon footprint' of an individual.

It states us the amount of CO_2 (metric tons) emitted by an individual. Through out a year, a large amount of carbon is being released by people during activities like taking food, drinking, clothing and occupation. Agricultural activities and transportation related with 'Food mile' is again related with transporting activities. Another major issue caused due to shortage of drinking water can be explained, by the concept of 'Water footprint'. You will learn more details about food mile, carbon footprint and water footprint in grade 11.



For extra knowledge

Carbon footprint

The amount of carbon dioxide released into the atmosphere within a given time period as a result of the activities of a particular individual, a production, an activity or an organization is a carbon foot print. Total carbon foot print cannot be calculated precisely as CO_2 is produced naturally and it needs more data to calculate.

Water footprint

The amount of fresh water utilized in the production or supply of the goods and services used by a particular person or group.

Food mile

The distance over which a food item is transported during the journey from producer to consumer, is known as food mile. This depends according to the amount of food consume per meal and the location where the food is produced.



Summary

- Following guidelines and policies required to maintain goods and services, not causing damage or causing minimum damage to the natural environment of the Earth, is referred to as green concept.
- Minimizing the emission of greenhouse gases which increase global warming is also a main objective of the green concept.
- In order to align with the green concept, the present agricultural and industrial processes should be subjected to a drastic transformation.
- The production process that improves the wellbeing of the agricultural environment, biological activity in soil, bio-diversity and biological cycles is called organic farming.
- Use of organic fertilizers is a main aspect of organic farming.
- Another aspect of organic farming is the adoption of traditional agricultural practices for pest control.
- Tank (wewa) is a system replete with the green concept. This is justified by considering the components of a common plan of a tank.
- Management of the use and development of the land resource is called land management
- Post-harvest technology is the cleaning, classifying and packing of the harvest of a crop immediately after packing the yields, so that its quality is preserved.
- The principle aim of green buildings or the sustainable construction concept is the construction of buildings with high efficiency of using energy, water and materials while minimizing the impact on man and the environment.
- Minimizing emission of greenhouse gases in transportation is called as green transportation.

Exercises

(01) Select the correct or most suitable answer.

- The meaning of green concept is described by following statements.
 - enhancing the plant cover appearing in green
 - minimizing the emission of greenhouse gases that increase global warming
 - maintaining goods and services not harming or harming minimally to the natural environment on EarthOut of these, select the correct statements,
 - Only a
 - Only a and b
 - Only a and c
 - a, b and c
- Utilization of solar energy supports the green concept because,
 - it conserves resources on Earth
 - it minimizes emission of greenhouse gases
 - more energy can be produced
 - it is available only during day time
- Select the substance that **cannot** be used to produce organic fertilizers, from the following.
 - Straw
 - Chaff
 - Plant litter
 - Polythene
- Which of the following introduces the substances, that can be used for making compost fertilizers?
 - Straw, plant litter, cow dung, animal urine
 - Straw, plant litter, polythene, cow dung
 - Plastic, straw, plant litter, animal urine
 - Papers, straw, plant litter, cow dung
- From the following statements, which one is **incorrect** about post-harvest technology?
 - Post-harvest technology is the cleaning, classifying and packing of the harvest immediately after harvesting so that its quality is preserved.
 - The major aim of post-harvest technology is the addition of preservatives to the harvest immediately after harvesting.
 - Harvesting, packing, transporting and selling the yield belong to post-harvest technology
 - Weakening of post-harvest technology causes hike in prices of the products.

6. Which one of the following is **not** followed in the construction of green buildings?

1. Collecting and using rain water
2. Heating water by solar heaters
3. Producing electricity by building natural gases
4. Purifying effluent water from bathrooms and to use in latrines

7. Some statements about organic farming are given below.

- a - Organic farming is favourable for soil micro-organisms
- b - The yield of organic farming is high quality
- c - Organic fertilizers is a major application of organic farming

Of the above, the true statement(s) is/are

1. Only a
2. Only a and b
3. Only a and c
4. a, b and c

8. Which of the following is **not** a feature of a building constructed according to the green concept?

1. Using natural light more
2. Fixing large windows for better ventilation
3. Producing electricity by solar cells
4. Using an air conditioner to maintain a suitable temperature

9. Consider the following two statements.

Statement A - Increase in global warming is a main environmental problem seen at present

Statement B - The main reason for the increase in global warming is the exclusive emission of greenhouse gases to the environment

Of the above statements,

1. Only A is true and B is false
2. A is false and only B is true
3. Both A and B are false
4. Both A and B are true

10. Which of the following is **not** an environment-friendly method of pest control,

1. Use of bio pesticides
2. Collect and destroy the pests
3. Use natural 'Kem krama' (simple and occult treatment that's done secretly)
4. Destroy the pests by machines

(02) Answer the following.

- i. Name a place where green concept can be well observed in Sri Lanka.
- ii. The artificially synthesized, highly poisonous substances used to control pests are called
- iii. Write two methods of generating electricity according to the green concept.
- iv. Write two advantages of the use of inorganic fertilizers.
- v. Write five substances that are used in day to day life which contain artificial chemical substances.

(03) Give short answers.

- i. What is green concept?
- ii. What is the aim of green concept?
- iii. State two things which are important in land management.
- iv. State two advantages brought about by promoting post-harvest technology.
- v. Write one way by which you can contribute to green transportation.

Technical Terms

Green concept	- හරිත සංකල්පය	- பசுமை எண்ணக்கரு
Organic fertilizers	- කාබනික පොහොර	- சேதனப் பசுளைகள்
Pest control	- පළිබෝධ පාලනය	- பீடைக் கட்டுப்பாடு
Water management	- ජල කළමනාකරණය	- நீர் முகாமைத்துவம்
Transportation of food	- ආහාර පරිවහනය	- உணவுப் போக்குவரத்து
Food preservation	- ආහාර පරිරක්ෂණය	- உணவு நற்காப்பு
Food security	- ආහාර සුරක්ෂිතතාව	- உணவுப் பாதுகாப்பு
Post harvest technology	- පසු අස්වනු තාක්ෂණය	- அறுவடையின் பின்னரான தொழினுட்பம்
Eco - friendliness	- පරිසර හිතකාමී බව	- சூழல் நேயமுடைமை
Green transportation	- හරිත ප්‍රවාහනය	- பசுமைப் போக்குவரத்து