Unit III- Environment & Sustainable Development

Environment– Meaning, Functions and Importance

Objective

After going through this lesson, you shall be able to understand the meaning of environment and its functions.

Environment: Meaning

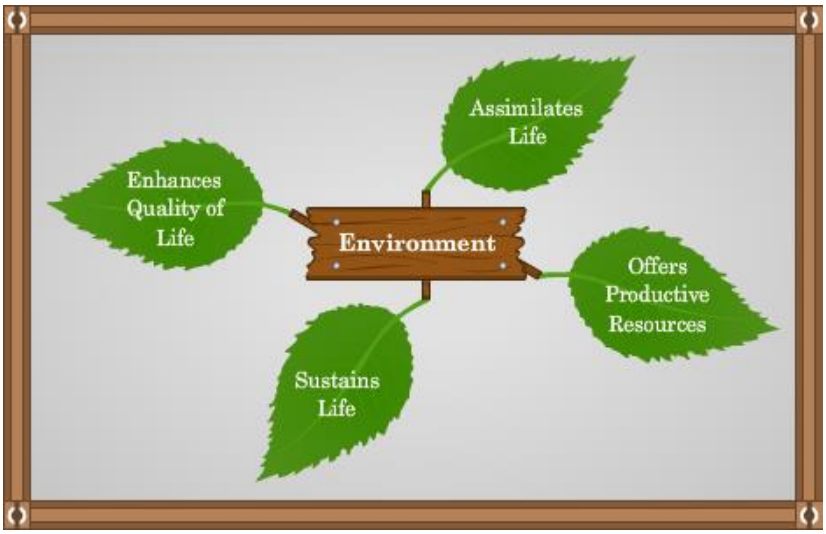
Our surroundings comprise a variety of living elements (plants, trees, animals, etc.) and non-living elements (air, water, mountains, etc.). Both these types of elements affect our existence. Without them, life would not be possible. Together living and non-living elements make up the environment.

Environment, thus, includes all biotic factors (i.e. living elements) and abiotic factors (i.e. non-living elements). It is the ***sum total of the surroundings and resources that affect our existence and quality of life***. In other words, environment encompasses biotic and abiotic components and their relations.

An important characteristic of environment is that it is ever-changing. For example, air and water circulate continuously, thereby causing changes in the climatic conditions. Similarly, certain species of animals and plants disappear and, at the same time, some other species or creatures appear in the environment. We can, thus, say that environment is dynamic in nature.

Functions and Importance of Environment

Environment is an essential component of human lives. The given figure provides an overview of the functions of environment.



The following is a detailed discussion of the functions of environment.

1. *Offers productive resources*: Environment provides us with tangible resources such as minerals, water and soil. These are gifts of nature. These resources act as inputs for converting natural resources into productive and useful things. In other words, environment provides inputs for production that enhances the quality of human life. Both renewable and non-renewable resources exist in nature. Renewable resources can get renewed or replenished quickly; for example, trees and fisheries. Non-renewable resources cannot get renewed or replenished quickly; for example, fossil fuels and minerals.

2. *Sustains life*: Environment provides us with the vital ingredients that are necessary for the survival of life; for example, sun, soil, water and air. In other words, environment supports life. Absence of such environmental elements implies absence of life. Environment also supports biodiversity.

3. *Assimilates w*astes: Various human activities generate wastes. Environment absorbs these wastes in the form of garbage.

4. *Enhances quality of life*: Environment includes surroundings such as rivers, oceans, mountains and deserts which have much scenic beauty. We all enjoy and admire the aesthetic beauty of our surroundings and this, in turn, adds to the quality of our lives.

Having discussed about the meaning and importance of environment, in the next lesson we will analyse the environment scenario in India.

India's Current Environment Scenario– State of Environment, Pollution, Deforestation, Land, Degradation

Objective

In this lesson, we will analyse India's current environment scenario.

India's Current Environment Scenario

India is fortunate to have abundant natural resources in the form of fertile soil, rivers and tributaries, forests, mineral deposits, mountains, etc. The Indo-Gangetic plains are the most fertile, densely populated and cultivated plains in the world. It stretches from the Arabian Sea to the Bay of Bengal. Similarly, the black soil of the Deccan Plateau is most suitable for the cultivation of cotton.

India’s lush green forests serve as a natural cover for a variety of wildlife species. Our country is endowed with numerous minerals such as coal, natural gas, copper and diamond. India holds more than 20% of the world’s total iron ore reserves. In addition, it also has a vast variety of flora. It is estimated that our country is home to around 15000 species of plants.

However, with time, the developmental activities in India have exerted tremendous pressure on natural resources. They have also affected human health and well-being. Population explosion and affluent consumption pattern have placed an undue and excess burden on environment. Environmental resources are being increasingly exhausted day by day.

However, the rate of consumption (demand) of natural resources far exceeds the rate of their replenishment (supply). This is because the regeneration capacity of environment is constant, and it cannot be increased to accommodate the increase in our demands. Consequent to the over-exploitation of natural resources, various environmental problems have cropped up in India.

Pollution levels have increased tremendously. Rivers and lakes are drying up. Deforestation has reduced the forest cover. More and more land is becoming degraded. Slowly, India is losing its rich biodiversity. Measures need to be taken to arrest the environmental degradation resulting from various environmental problems and restore the ecological balance of the country.

Let us analyse the different environmental problems in greater detail.

Pollution

Pollution refers to the contamination of the natural environment as a consequence of human activities. Pollution leaves environment in an undesirable state. Environmental pollution is one of the major concerns associated with the development process.

Pollution can take the following three forms.

i. Air pollution

ii. Water pollution

iii. Noise pollution

1. *Air pollution*: Air pollution implies contamination of air. Various pollutants such as CO_2, CO, SO_2 and SO pollute air. Vehicles are mainly responsible for air pollution in India. In 2003, the number of motor vehicles in India was estimated to be 67 crore. Besides vehicular pollution, industrial pollution is also significant in India. With growth and development, the number of industries has increased tremendously. These industries often emit smoke and other poisonous gases into air. Air pollution results in various health problems such as hypertension, asthma and cardio-vascular diseases. Thus, steps must be taken to control air pollution and search for pollution-free alternatives such as CNG (compressed natural gas).

2. *Water pollution*: Water is a basic element of human life. With increasing level of growth and development, water resources are increasingly getting polluted. Often,

industrial waste is dumped into rivers and lakes. Also, increased use of fertilisers and pesticides in farming has led to the contamination of groundwater. Contaminated water causes various deadly diseases such as diarrhoea, hepatitis and cholera.

In its efforts to control the levels of air and water pollution, the Government of India set up the Central Pollution and Control Board (CPCB) in 1974. CPCB investigates and collects data regarding air and water pollution. The board also suggests measures to control and prevent pollution.

It formulates various plans and policies in this regard. For example, the board provides guidelines for the treatment of sewage and industrial wastes. It also monitors the quality of water in rivers, lakes and ponds.

3. *Noise pollution*: With technological advancement and heavy reliance on machines, there has been a huge improvement in efficiency levels. While machines have increased efficiency, they have also increased the level of noise pollution.

In addition to heavy machines, a number of appliances we use in daily life are also responsible for causing noise pollution; for example, washing machines, mixer grinders, vehicles, music systems, etc. Noise pollution has led to an increase in the level of irritation and anger in human beings and this has, in turn, resulted in the deterioration of their overall quality of life.

Deforestation

Deforestation refers to the process of clearing of forest cover. It leads to a reduction in the level of oxygen in air, soil erosion, climate change and global warming. In India, as per the estimates for 2009, only 1.7% of the total land area is left as “very dense forest”.

As per the estimates, there is a requirement of 0.47 hectares of per capita forest land. However, the available per capita forest land in India is only 0.08 hectares. Today, an increasing number of trees are being felled to meet different needs.

The given figure provides an overview of the three main causes of deforestation.

The following is a detailed discussion of the main causes of deforestation.

1. *River valley projects*: Multi-purpose river valley projects such as the Bhakra dam project and the Damodar river valley project are being developed at the cost of the forest cover.

2. *Increasing population and urbanisation*: The ever-growing population with its ever-growing demands has increased deforestation. Population explosion has triggered an excessive demand for housing. Trees are increasingly being cut down to meet this demand. Consequently, the forest cover is gradually reducing. Though a high degree of urbanisation indicates a high standard of living, the adverse impact that it has upon the environment is a cause for concern. The deforestation caused by urbanisation has resulted in a drastic fall in the land-per-man ratio.

3. *Industrialisation*: In the blind rage to achieve economic development, the process of industrialisation acts as an important catalyst. In order to speed up the process of industrialisation, natural resources are being exploited at a rapid pace. Industrialisation, on the one hand, enhances our living standards; however, on the other hand, it leads to deforestation and the depletion of other natural resources.

Deforestation has resulted in serious problems such as soil erosion, changes in climatic conditions, fall in the level of rainfall and drying up of rivers. The need of the hour is to discourage deforestation and promote afforestation.

The Chipko Movement and the Appiko Movement were launched for the same purpose. These movements were characterised by volunteers hugging trees and, thereby, preventing the cutting down of trees. The volunteers wanted forest officials and

contractors to follow certain rules and regulations with regard to the cutting down of trees. Similar movements, awareness drives and plans and policies are needed to help rectify the environmental problems created by deforestation.

Wildlife sanctuaries and national parks such as Jim Corbett National Park must be set up. People must be made aware of the dire consequences of deforestation and must be encouraged to plant new trees. Also, moves such as the free distribution of saplings by the government should be increasingly followed.

Global Warming

Global warming refers to the increase in global temperature due to the significant rise in the percentage of greenhouse gases (particularly carbon dioxide) in the atmosphere. The increase in the level of carbon dioxide in the atmosphere raises the temperature of Earth's surface. This rise in temperature accelerates the melting of polar ice and this, in turn, leads to the rise in sea level.

This disturbing of ecological balance increases the incidence of natural calamities and, thereby, poses a threat to human life. Increased industrialisation and deforestation are the two main causes of global warming. Global warming has emerged as a major concern for the world. Various steps are being taken to control global warming. For example, in 1997, at a UN conference in Japan, an international agreement was formulated for the reduction in the emission of greenhouse gases.

Ozone Depletion

Ozone depletion refers to the fall in the level of ozone in the stratosphere. Ozone acts as a shield for the surface of Earth and, thereby, helps in the sustenance of life on the planet. It prevents harmful ultraviolet (UV) radiations from reaching Earth's surface. An excessive use of cooling substances (chlorofluorocarbons) in air conditioners and refrigerators has led to a gradual thinning of the ozone layer.

Depletion of ozone increases the possibility of UV radiations reaching Earth's surface. This poses a threat to life on Earth. UV radiations are responsible for deadly diseases such as skin cancer. Also, ozone depletion has resulted in the extinction of various aquatic species. Thus, ozone depletion is a serious cause for concern for the world.

Land Degradation

The gradual and consistent loss of fertility of land is referred to as degradation of land. Land degradation is emerging as a serious concern in the context of environmental issues in India. The loss of productivity and the further loss in the usefulness of land are the outcomes of degradation of land. Biodiversity also gets affected due to such degradation. The levels of land degradation are fast becoming irreversible, especially in arid and semi-arid areas. As per the State of Environment (SoE) Report, out of the total geographical area of 306 million hectares (Mha), 146.82 Mha was degraded land.

The following are some of the factors contributing to land degradation.

1. *Soil erosion*: The removal of the uppermost layer of soil by agents such as strong winds and floods is termed as soil erosion. The topmost layer of soil contains major and essential nutrients such as nitrogen, phosphorus and potassium. The loss of this layer deteriorates the quality and productivity of land.

2. *Alkalinity and salinity of soil*: Water logging is the reason behind the salinity and alkalinity of soil. Water, if present in excess on the topmost layer of soil, absorbs all the nutrients present in soil and, thereby, reduces its fertility.

3. *Deforestation*: The ever-growing demands of an ever-growing population leads to large-scale destruction of forest cover. Reduction of forest cover leads to soil erosion and this, in turn, causes climatic changes.

4. *Shifting cultivation*: The practices of shifting cultivation and subsistence farming (carried out by small and marginal farmers) result in the depletion of soil nutrients and fertility.

5. *Excessive use of chemicals*: Excessive use of chemical fertilisers, insecticides and pesticides lowers the quality and fertility of soil.

6. *Desertification*: The spread of deserts in arid and semi-arid areas is referred to as desertification. It occurs due to overgrazing. Desertification results in the reduction of lush green areas and this, in turn, results in the depletion of soil fertility.

Causes of Environmental Degradation

The following are some of the major factors responsible for environmental degradation.

1*. Pressure of population*: The pressure exerted by population explosion is one of the main causes of environmental degradation. With increasing population, the demand for land for commercial purposes (such as industries) and construction purposes (such as housing) has increased tremendously. This growing demand has led to the ruthless exploitation of land.

2. *Poverty*: In India, the rural poor are compelled to fell trees for fulfilling their basic needs such as fuel for cooking. This cutting of trees by the poor has led to massive erosion of natural capital.

3. *Urbanisation*: Increasing urbanisation has put pressure on housing and other amenities. To meet the needs of urbanisation, forests and other natural resources are being increasingly exploited.

4. *Industrialisation*: Over the years, there has been a sharp rise in the number of industries. These industries often emit pollutants into air, water and soil and, thereby, cause environmental degradation.

5. Increased use of insecticides, pesticides and chemical fertilisers: Increased use of insecticides, pesticides and chemical fertilisers in farming has led to the degradation of land due to the lowering of its natural fertility.

6. *Increase in the number of transport vehicles*: There has been a huge increase in the number of transport vehicles. These vehicles have led to a rise in air pollution and noise pollution levels.

7. *Disregard of civic norms*: In India, citizens have little regard for civic norms. Most of us are indifferent to issues relating to environmental pollution and degradation and, therefore, continue with practices that contribute to the same.

To conclude, we can say that environmental degradation is a major cause of concern for both India and the world. What steps can be taken to curtail this degradation of environment? We will tackle this question in the next lesson and explore the various methods of saving environment.

Methods to Save Environment

Objective

In this lesson, we will discuss about the need to save environment and the various measures that can be adopted in this regard.

Need to Save Environment

Environment sustains life through the provision of sunlight, air, water, etc. Growth and development necessitates the constantly growing demand for environmental resources. However, the stock of natural resources is not enough to meet this increasing demand for resources. Human exploitation of nature exceeds the absorptive capacity of environment. Population explosion and industrial revolution have rapidly raised the demand for resources for both production and distribution.

However, the rate of regeneration of these resources is much lower than the rate at which they are being extracted. This reversal in the demand and supply relationship is referred to as the ***supply-demand reversal of environmental resources***. As a result, environmental crisis is looming large over all the countries of the world. With pressure mounting on its carrying capacity, environment is failing to perform its basic function of life sustenance.

The undue strain on environment has led to the different environmental problems that

the world faces today; for example, rising pollution levels, deforestation, global warming, depletion of the ozone layer, land degradation, etc. Therefore, there is the urgent *need to correct the environmental damage* that has been done.

C*orrection of environmental damages involves* high opportunity cost. Opportunity cost is the cost foregone when we make a choice or a decision. If a piece of land is to be used for wheat production, then the production of another crop (say, rice) will have to be sacrificed. This loss of rice production is the opportunity cost of producing wheat.

In a similar way, the opportunity cost of correcting environmental damages refers to the huge amount of expenditure incurred on searching for new efficient alternatives. Since resources are being extracted at a rate that is faster than their rate of regeneration, there is the need to explore new alternative resources.

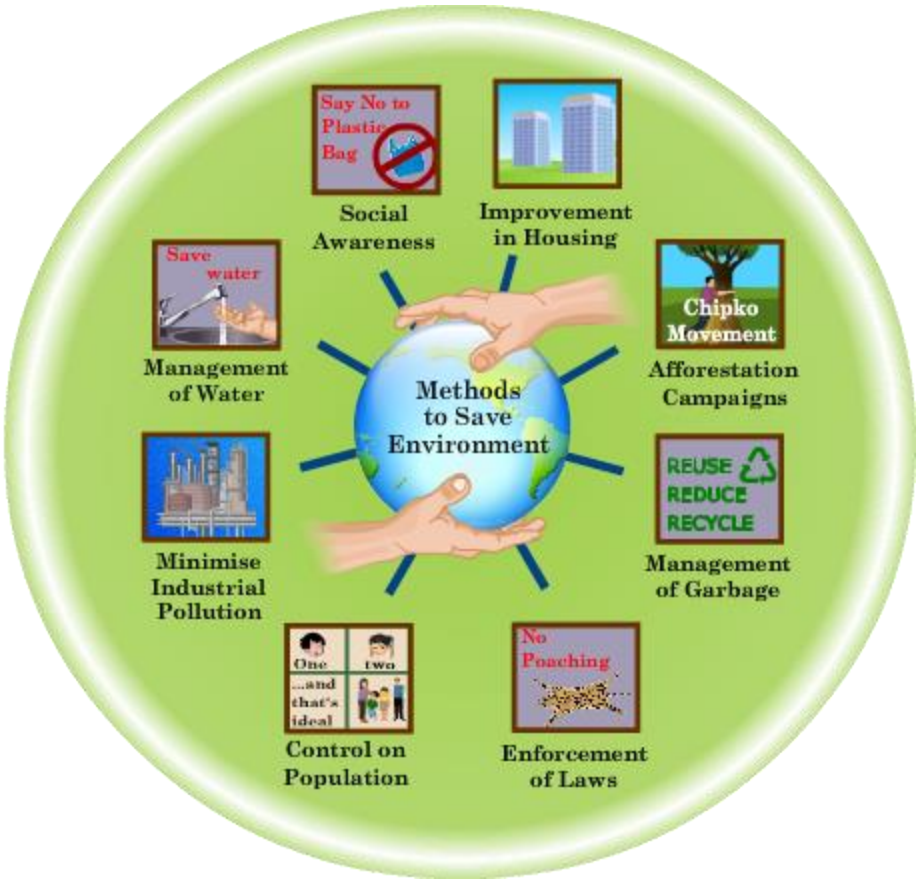
However, the discovery of such resources necessitates heavy investment expenditure by governments. Further, the implementation and maintenance of these alternative resources involves very high cost. The best example in this regard is the move towards CNG to reduce the rising problem of pollution in Delhi.

The government incurred heavy investment expenditure to popularise CNG and to make consumers aware of its usefulness. Nevertheless, such measures to correct environmental damages are the need of the hour.

aware regarding its uses. Nevertheless such measures to correct the damage of the environment are the need of the hour.

Measures to Save Environment

The given figure provides an overview of the measures that can be taken to save environment.



1. *Social and general awareness*: It is necessary to make people aware about the various environmental problems confronting us and how each individual can contribute towards the cause of saving environment. For example, people should be made aware of the adverse effects of vehicular pollution and, thereby, encouraged to use alternative eco-friendly fuels such as CNG.

2. *Control on population*: Higher population increases the burden on the existing natural resources. These resources are extracted at a rapid pace to meet the demands of the growing population. This, in turn, adversely affects environment. Thus, population needs to be controlled in order to save environment.

3. *Enforcement of laws*: Governments formulate various laws and policies for the protection and conservation of environment. For example, the Government of India passed the Environment (Protection) Act in 1986. Under this act, various rules have been drafted which aim at checking the quality of environment. Similarly, the Forest (Conservation) Act, 1980 was passed with the aim of checking the diversion of forest land to other uses. This same objective of environmental protection was behind the passing of the Wildlife Protection Act, 1972 and the setting up of Pollution Control Boards. There is an urgent need to strictly enforce these acts and rules.

4. *Afforestation campaigns*: It is important to protect the existing forest cover; however, it is equally important to promote afforestation. People should be guided and encouraged to launch afforestation campaigns and plant more trees.

5. *Minimisation of industrial and agricultural pollution*: Industrialisation and the use of advanced technology are important constituents of the development process. However, the environmental pollution caused by industries must be controlled. Stress should be laid on using environment friendly methods and techniques. Similarly, in the agricultural sector, the use of chemical fertilisers and pesticides should be minimised so as to limit the damage done to environment. Further, organic farming techniques should be encouraged to maintain the ecological balance.

6. *Management of water*: Water is an essential element of human life. Water-bodies such as the rivers and lakes should be kept clean. Often, industrial and domestic wastes are dumped in rivers. Steps must be taken to stop this practice.

7. *Management of garbage*: Solid wastes such as garbage are a major source of pollution. Such wastes should be chemically treated so as to reduce their adverse impact on environment. Biodegradable wastes can be converted into compost. Further, recycling of wastes must be encouraged.

8. *Improvements in housing conditions*: In India, a large section of population resides in slums. Slum dwellers often live in unhygienic and health hazardous conditions. These poor and unhygienic conditions give birth to various deadly diseases. In recent past, India has been has witnessed many outbreaks of life-taking diseases such as plague, swine-flu, etc. Also, the slums usually lacks proper waste-disposal mechanisms. These factors further adds on to the environment degradation. Hence, emphasis should be laid on the improvements in housing for the poor and deprived people.

Sustainable Development– Meaning and Strategies

Objectives

In this lesson you will go through the following topics.

• Meaning of sustainable development

• Features of sustainable development

• Strategies for sustainable development

Meaning of Sustainable Development

In the earlier centuries, the process of growth and development was undertaken without any concern for environment. The demand for environmental resources was much lower than their supply. Environment was able to support the world's population as the rate of use of resources was lesser. Further, the rate of regeneration of resources exceeded the rate at which the resources were exploited.

Today, however, things are a lot different. With increasing industrialisation and urbanisation, the stress is on the full utilisation of resources. Humans have started exploiting nature to the maximum. As a result, several environmental problems (e.g. pollution, global warming, ozone depletion, land degradation, deforestation, etc.) confront the world. The rate of exploitation of natural resources far exceeds the rate of their regeneration. Consequently, the average quality of human life is on the decline.

It is our moral responsibility to hand over our planet Earth to the future generations in better shape than how we found it. The realisation has set in that non-renewable resources are depleting so fast that there will not be enough to meet the production capacity of the future generations.

The economic development achieved as a result of overexploitation of resources cannot be sustained for a long time. This is because in the absence of productive resources, the production capacity of the future generations will reduce. Thus, there is the need for an economic development that is *sustainable*.

The concept of sustainable development was introduced by the Brundtland Commission in 1987. ***Sustainable development is the process of economic development that aims at meeting the needs of the present generation without compromising the ability of the future generations to meet their own needs*.**

In other words, sustainable development lays emphasis on maximising the welfare of both the present and future generations. It stresses that the future generations should have access to a quality of life which is at least as high as that of the present generation.

The concept of sustainable development suggests that the rate of economic growth and development should be such that there is optimum and judicious utilisation of resources. This promotes inter-generational equity whereby the future generations' ability to meets their own needs does not get reduced.

Salient Features of Sustainable Development

The following are the four major features of sustainable development.

1. *Inter-generational equity*: Sustainable development emphasises that the ability of the future generations to meet their own needs should not get reduced. The resources should be optimally and judiciously utilised such that the future generations can enjoy a quality of life which is at least as high as that of the present generation.

2. *Efficient use of natural resources*: Sustainable development stresses that natural resources should be utilised in an efficient and rational manner such that they are not overexploited.

3. *Sustained increase in real per capita income*: The process of growth and development should be such that there is a sustained rise in real per capita income (i.e. per capita income measured at base year prices). A consistent rise in real per capita income implies a rise in overall welfare. In other words, the concept of sustainable development highlights the importance of growth along with welfare.

4. *No rise in environmental degradation*: Sustainable development suggests that activities which harm the environment should not be undertaken. Such activities reduce the quality of life of both the present and future generations.

Sustainable Development v/s Economic Development

Sustainable development and economic development are distinguished on the basis of following points.

Basis of Distinction	Sustainable Development	Economic Development
Future Generation v/s Present Generation	It implies a sustained rise in the real per capita income of both the present as well as the future generation.	It implies a rise in the real per capita income of only the present generation.
Stress on Environment Protection	It emphasis the need to protect the environment.	It does not lay emphasis to protect the environment.
Stress on Rational Utilsation of Natural Resources	It stresses on rational and efficient utilisation of resources.	It stresses on just the fuller utilisation of resources and not their rational utilisation.

Strategies for Sustainable Development in India

India is part of the global drive towards sustainable development. It has taken certain steps in this regard in accordance with the views of a leading environmental economist named Herman Daly. These steps are discussed below.

1. *Population control measures*: India has taken various measures to arrest population explosion. These include increasing awareness about birth-control measures, promoting literacy, launching family planning programmes and formulating policies for population control.

2. *Use of environment-supportive fuel*: Petrol and diesel are fuels that emit huge amounts of carbon dioxide, which leads to global warming. So, the Indian government has promoted the use of CNG and LPG. These are clean, eco-friendly fuels that emit less smoke.

3. *Use of solar and wind energy*: Sunlight and wind are two natural resources that are inexhaustible. The use of such natural resources is in line with the objective of sustainable development. India has taken steps to harness solar and wind energy.

4. ***Recycling and ban on plastic bags***: Industrial and household wastes should be accumulated and managed properly. Further, recycling of non-biodegradable products such as plastics needs to be promoted in order to sustain environment. Biodegradable wastes such as animal waste can be used as manure for farming. A very recent initiative taken by the government is the ban on the use of plastic bags.

5. *Pollution tax and fines*: The Indian government has taken many steps to control pollution. Making regular vehicle checkups necessary and levying pollution tax on industries emitting smoke are two such measures. The government has come up with different pollution-control laws. Breaking of these laws entails huge fines and even imprisonment.

6. *Use of input-efficient technology*: Various input-efficient methods have been devised that increase not only production and productivity, but also the efficiency with which the inputs are used. Efficient use of inputs leads to lesser exploitation of natural resources. It also enhances the future economic growth prospects of our country.

7. Encouraging the use of public transport: To counter the increasing level of private vehicular pollution, the government has promoted the use of public transport such as public buses and metro rails. Further, the government needs to improve the quality and safety of public transport so that more people are encouraged to use the same.

Thus, the Indian government has taken various measures to achieve the objective of sustainable development. There is a need to take up more such measures and actively work towards their efficient implementation.