KERALA PUBLIC SCHOOL, KADMA

ENVIRONMENTAL APPLICATION (STUDY MATERIAL)

SESSION :2020-‘21

CLASS : IX

TEACHER : SHUBHA CHOUBEY

UNIT 1 : Our Main Environmental problems

Ch.5: Land Use

LAND USE

Land is one of the most important natural resources on which all of man's activities are depended upon.
Land is a present given by the nature to the human being so it is the basic resource of human society.
Land use is the surface use of all developed and vacant land on a specific point at a given time and space.
The layout or arrangement of the uses of the land is known as "land use pattern". The land may be used for agriculture, forest, pasture etc. Land use is determined by many factors like relief features, climate, soil, density of population, technical and socio-economic factors.

Land use change is a process by which human activities transform the natural landscape, referring to how **land** has been used, usually emphasizing the functional role of **land** for economic activities.

The important types of land use in the country are :-

1. Forests area
2. Land not available for cultivation
3. Cultivable wasteland
4. Fallow land
5. Net area sown

Forest area

During 1950-51 the area under forest was only 40.48 million hectares (14.2%) in India. But it has been increased to 80.20 million hectares (24.39%) in 2017-2018.

Land not available for cultivation

The land used for human settlements, transport routes, canals, quarries, the mountains, deserts, marshes etc. are coming under this category. It accounts 12.11% of total land in India.

Other uncultivated lands including fallow lands

This category includes permanent pasture and other grazing area, land under miscellaneous tree, crops, groves and cultivable waste. This category covers about 8.6 % of the country's total reporting land.

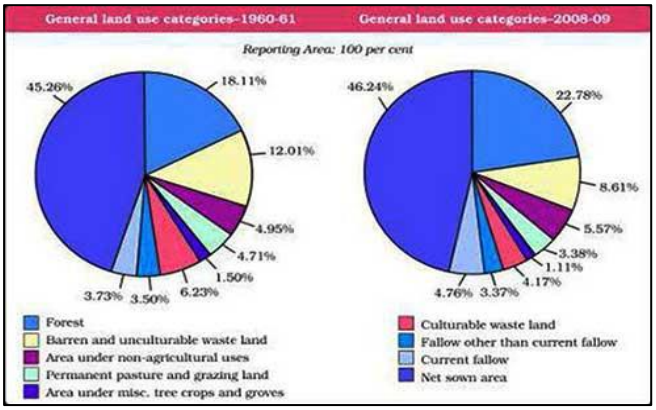
Fallow lands

The land which is not utilized for cultivation for last 3 to 5 years is considered as fallow land. It may be cultivated. It accounts for about 8.13 % of the India's total land.

Net area sown

India has a net sown area of 46.2% of the total reporting land in India. There has been a phenomenal increase in the net area sown during the last five decades.

Changes in **Land Use Patterns**:
In 1951-52, the net area sown was 119.4 million hectares; in 2006-07, it was more than 141 million hectares. However, there is a slight decline from the 1990s.
Forest **cover** had increased from about 14 per cent of **land cover** in 1951-52 to more than 23.5 per cent in 2006-07.



IMPACTS OF CHANGING PATTERNS OF LAND USE

- Conversion of farmlands into urban developments reduces the amount of land available for food & timber production.

- Human activities such as deforestation, mining and quarrying have contributed to the slow growth rate of forests. Thus, land under forest has increased by only about 4% since 1960-61.

- Forests remove carbon dioxide from the atmosphere. Thus reduction in forests due to industrialisation is resulting in global warming.

- Forests are habitats to varieties of plants & animals. Thus its destruction causes extinction of species.

- Soil erosion, salinisation, desertification etc, associated with modern agriculture reduce the quality of land resources and future agricultural productivity.

- Technological development has led to industrialization which has increased the use of natural resources.

- Technological development has converted the subsistence agriculture to commercial agriculture and this has led to the over utilization of soil.

MODERN AGRICULTURE

Modern agriculture is an evolving approach to agricultural innovations and farming practices that help farmers increase efficiency and reduce the number of natural resources like water, land, and energy necessary to meet the world's food, fuel, and fibre needs.

The agribusiness, intensive farming, organic farming, and sustainable agriculture are other names of modern agriculture.

THE BASIC FEATURES OF MODERN AGRICULTURE

(i) HYV seeds

Under the new agricultural strategy special emphasis has been placed on the development and widespread adoption of high yielding varieties of seeds. Production of improved seeds (HYV seeds) was encouraged by both the Central and State Governments. As a result of the use of HYV seeds, production of food grains had increased from 25 lakhs quintals in 1980-81 to 105 lakhs quintals in 2003-04.

(ii) Chemical Fertilizers

Indian soil is deficient in nitrogen and phosphorous and this deficiency is reduced by increasing the use of chemical fertilizers.

(iii) Irrigation

Increase in agricultural production and productivity depends on the availability of water. Moreover, the use of HYV seeds and chemical fertilizers required adequate supply of water. Hence, irrigation (i.e., artificial ways of supplying water in the cultivatable lands) is the basic requirement for the successful implementation of Green Revolution.

(iv) Pesticides

Pesticides are defined as any substance or mixture of several substances which prevented the HYV seeds and plants from the diseases and unwanted pest-attacks. Thus, the use of various types of chemical pesticides (compounds) for controlling pest-attacks is an essential element of modern agricultural techniques.

(v) Multiple Cropping

India enjoys tropical and sub-tropical climatic conditions. Therefore, she has huge potentialities to grow crops on a year round basis and Multiple cropping is carried out.

Multiple cropping is the practice of growing two or more crops in the same piece of land during one growing season instead of just one crop.

(vi) Crop rotation

The rotation of cultivation allows to plant different types of crops in the same place by which the soil is allowed to recover the nutrients that were removed by a previous crop.

This technique is considered to be one of the most powerful in modern agriculture, since it avoids the consequences of the same type of cultivation in the same area, year after year.

(vii)Cattle raising

Modern agriculture and livestock farming depend on each other and are part of the valuable resources that the land offers. Each plant or animal has a specific role within this process.

(viii)Machinery

This is an element of great importance in modern agriculture. For soil preparation, irrigation, seed sowing, crop harvesting, fertilization and pest control, each of these activities requires use of modern machinery.

HARVESTOR

SOWER

THRESHER

(ix)Technology

Agricultural technology is considered one of the most striking and revolutionary areas of this field as it is focused on producing enough food to meet the growing demand of the population.Modern farmers can do a better job compared to their ancestors.The technology has changed the way the machines operate, the use of computer systems, global positioning systems (GPS), automatic management programs, reduce fuel consumption, loss of seeds and fertilizers, among others.

ADVANTAGES OF MODERN AGRICULTURE

(i) Modern machinery like tractors and threshers when used in farming make ploughing and harvesting faster.
(ii) With the use of HYV seeds the production of wheat has increased manifold.
(iii) Farmers have greater amounts of surplus wheat to sell in the markets which eventually has improved their economic condition.

DISADVANTAGES OF MODERN AGRICULTURE

(i) Excessive use of chemical fertilisers reduces the fertility of the soil

(ii) Surface water runoff from agricultural fields pollute the nearby water bodies and also underground water table.

(iii) Fertiliser nutrients that enter surface waters (lakes, ponds etc.), cause Eutrophication, ie sudden growth of photosynthetic algae. Algal blooms turn the water bright green, prevent light from penetrating beneath surface layers, and therefore killing plants living on the bottom. Eventually, such nutrient enrichment of freshwater ecosystems leads to the destruction of all animal life in the water systems.

(iv) Chemical fertilisers also cause air pollution which end up in Ozone depletion and Global warming

(v) Heavy machines used in Modern agriculture are quite expensive and cannot be afforded by all. Their maintenance cost is also very high.

(vi) Due to lack of practical knowledge the farmers cannot handle the machines properly.

WATER POLLUTION

Water pollution is the contamination of water bodies, usually as a result of human activities.Water bodies include for example lakes, rivers, oceans, aquifers and groundwater. Water pollution results when contaminants are introduced into the natural environment.

FACTORS CAUSING WATER POLLUTION

1. **Agriculture runoff** - carrying fertilizers, pesticides/insecticides/herbicides and other pollutants into water bodies such as lakes, rivers, ponds

2. **Leaking sewer lines** – may add trihalomethanes (such as chloroform) as well as other contaminants into groundwater ending up contaminating surface water, too. Discharges of chlorinated solvents from dry-cleaners to sewer lines are also a recognized source of water pollution

3. **Mining activities** – mining activities involve crushing rocks that usually contain many trace metals and sulfides. The leftover material from mining activities may easily generate sulfuric acid in the presence of precipitation water.

4. **Industrial discharges** – discharges produced by industrial sites may add significant pollution to water bodies

5. **Accidental leaks and spills** – associated with handling and storage of chemicals

6. **Burning of fossil fuels** – the emitted ash particles usually contain toxic metals (such as As or Pb). Burning also add a series of oxides including carbon dioxide to air and, respectively, water bodies.

7. **Construction activities** – construction work can release a number of contaminants into the ground that may eventually end up in groundwater.

8. **Plastic materials/waste in contact with water** – may degrade slowly releasing harmful compounds for both human health and ecosystem.

9. **Leaking landfills** – may pollute the groundwater below the landfill with a large variety of contaminants

10. **Disposal of personal care products and household chemicals** including detergents and various cleaning solutions

CONSEQUENCES OF WATER POLLUTION

1. **Diseases**: In humans, drinking or consuming polluted water in any way has many disastrous effects on our health. It causes typhoid, cholera, hepatitis and various other diseases.

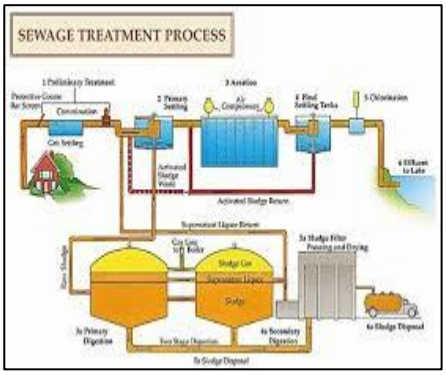
2. **Destruction of Ecosystems**: Ecosystems are extremely dynamic and respond to even small changes in the environment. Water pollution can cause an entire ecosystem to collapse if left unchecked.

3. **Eutrophication**: Chemicals in a water body, encourage the growth of algae. These algae form a layer on top of the pond or lake which decreases the amount of oxygen in the water body, severely affecting the aquatic life there.

4. **Effects the food chain:** Disruption in food chains happens when toxins and pollutants in the water are consumed by aquatic animals (fish, shellfish etc) which are then consumed by humans.
5. **ECONOMIC EFFECTS**- Managing and restoring polluted water bodies is expensive. For example, **Japan declared in 2019** that it is running out of space to contain the contaminated water after the **Fukushima disaster**. It currently has over a million tons of contaminated water stored in tanks. Research shows that it will cost at least $660 billion to clean up the effects of the disaster.
   In normal conditions, it costs more to purify drinking water, not to mention the health cost of treating diseases resulting from contaminated water.

WATER POLLUTION CONTROL

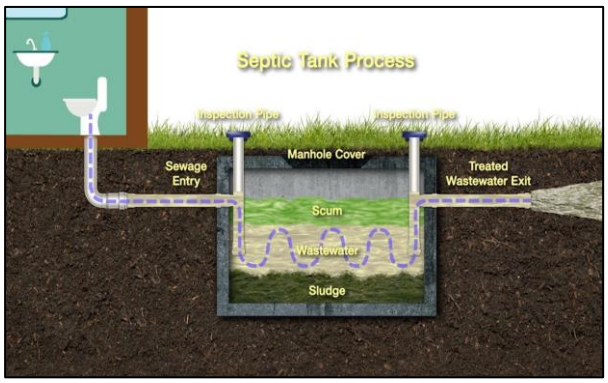
1. Municipal wastewater treatment



In urban areas of developed countries, municipal wastewater (or sewage) is typically treated by centralized sewage treatment plants. Well-designed and operated systems (i.e., with secondary treatment steps or more advanced treatment) can remove 90 percent or more of the pollutant load in sewage.

2. On-site sanitation and safely managed sanitation

Households or businesses not served by a municipal treatment plant may have an individual septic tank, which pre-treats the wastewater on site and infiltrates it into the soil. This can lead to groundwater pollution if not properly done.



3. Industrial wastewater treatment

Some industrial facilities generate wastewater that is similar to domestic sewage and can be treated by sewage treatment plants. Industries that generate wastewater with high concentrations of organic matter (e.g. oil and grease), toxic pollutants (e.g. heavy metals, volatile organic compounds) or nutrients such as ammonia, need specialized treatment systems. Some industries install a pre-treatment system to remove some pollutants (e.g., toxic compounds), and then discharge the partially treated wastewater to the municipal sewer system.

4. Erosion and sediment control from construction sites

Sediment from construction sites is managed by installation of:

- Erosion controls, such as **Mulching** and **Hydroseeding**
- Sediment controls, such as **Sediment Basins & Silt Fences**

MULCHING

HYDROSEEDING

SEDIMENT BASIN

SILT FENCES

5. Awareness must be spread regarding the effects of water contamination utilizing the media.

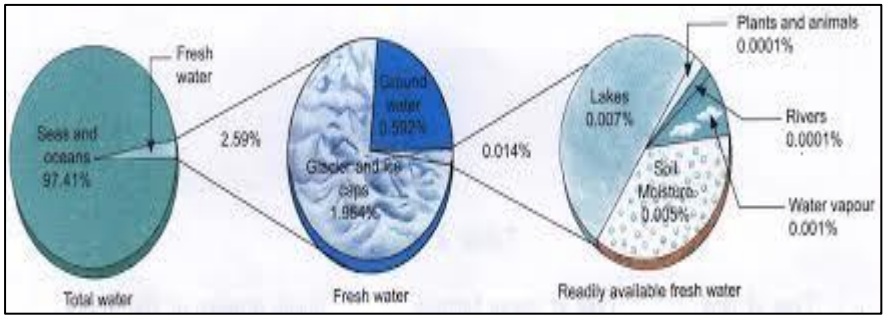
6. Laws and practices must be set up to anticipate water contamination and these laws must be adapted occasionally based on the requirements.

7. Sanitation system must be developed. The advantages of cleanliness should be explained to both the urban and rural areas. Proper drainage systems must be installed.

WATER SCARCITY

Water scarcity is the lack of fresh water resources to meet the standard water demand. This was listed in 2019 by the World Economic Forum as one of the largest global risks

WATER AVAILABILITY ON EARTH

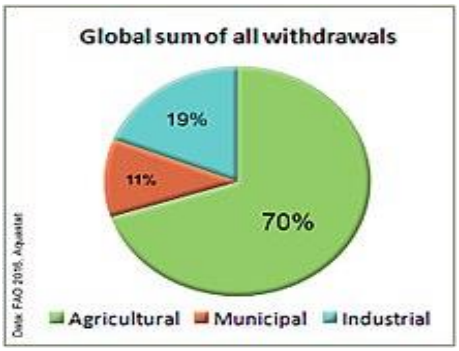


Water covers 70% of our planet. However, freshwater, the stuff we drink, bathe in, irrigate our farm fields with, is incredibly rare. Only 3% of the world's water is fresh water, and two-thirds of that is tucked away in frozen glaciers or otherwise unavailable for our use.

SUPPLY AND DEMAND OF WATER

The total amount of easily accessible freshwater on Earth, in the form of surface water (rivers and lakes) or groundwater (in aquifers, for example), is 14.000 cubic kilometres (nearly 3359 cubic miles). Of this total amount, 'just' 5.000 cubic kilometres are being used and reused by humanity.

Scarcity as a result of consumption is caused primarily by the extensive use of water in agriculture/livestock breeding and industry. People in developed countries generally use about 10 times more water daily than those in developing countries.



ACCESS TO WATER

Some 1.1 billion people worldwide lack access to water, and a total of 2.7 billion find water scarce for at least one month of the year.

As per the international norms, countries with per-capita water availability less than 1700 m3 per year is categorized as water stressed, with per capita available water of 1545 m3 India is definitely water stressed country (India-WRIS wiki 2015, Census, 2011). Studies shows that the projected per capita water availability will become 1401 m3 and 1191 m3 by 2025 and 2050 respectively and eventually India is likely to become a water scarce country

2019 Chennai Water Crisis

In June 2019, the Indian city of Chennai faced an acute water shortage after its 4 main water reservoirs ran completely dry. Chennai is India's 6th largest metropolis with a population of roughly 9 million people. The dire shortage of water affected the huge population of Chennai very badly as hundreds of people waited in lines with empty water buckets for hours. Several restaurants and hotels in the city also shut down due to the shortage of water.
Out of the daily requirement of 830 million litres per day, the city was only able to provide 525 million litres per day.

CAUSES OF WATER SCARCITY

1. **Water Pollution** – Most of the sources of water in rural are terribly polluted due to poor sanitation and lack of waste treatment plants.
2. **Groundwater over drafting** – The excessive use of groundwater in our agricultural industries is leading to scarcity of water. Over 70% of our water is used to grow crops and most is wasted due to leaky pipes and poor watering techniques. Nearly 89% of the groundwater extracted in India is used for irrigation.

3. Wastage of water

India catches only 8 percent of its annual rainfall due to poor rainwater harvesting. A lot of the ponds which used to capture water have been lost due to rapid urbanisation, rising population and inefficient implementation of city planning guidelines.

India has also been lacking in the treatment of wastewater for reuse. Approximately 80 percent of domestic wastewater is drained out as waste and ends up flowing into other water bodies which lead to salt water sources such as the Bay of Bengal and the Arabian Sea.

4. Climate change

Due to urbanisation, deforestation and pollution, there is change in the climate resulting in reduction of rainfall. This has reduced the amount of surface water.

5. **Lack of infrastructure** – Poor regions often don't have the funds or education to implement proper infrastructures such as waste treatment and recycling plants.

6. **Mismanagement** – Improper training and education lead to a needless waste of safe clean water every day, as well as overuse in areas that don't require so much water.

7. Illegal dumping

Illegal dumping is another significant reason for water shortages. Industries frequently dispose of their industrial garbage into nearby rivers and lakes since it is an easy and cheap way to get rid of this waste. It leads to serious water pollution, which may result in severe water crisis.

8. Global Warming

Global warming is another important cause of water scarcity. When our average air temperature becomes warmer, water from rivers and lakes evaporates faster, which may contribute to the drying up of water bodies.

9. Natural Disasters

Natural disasters like tsunamis, floods may also cause severe water shortages for the local population since important public infrastructure may be destroyed. The severe natural disaster may entirely collapse the local water supply.

DISASTROUS EFFECTS OF WATER SCARCITY

1. Lack of Access to Drinking Water

The biggest problem that happens when you have water scarcity is that people are not able to get fresh, clean drinking water. The human body can hardly survive so long without water, and a lack of drinking water can result in a number of other problems, which we discuss below.

2. Hunger

If there is no water that can be used to help water the crops, then you are going to have people that are going hungry. Animals will also die, which will result in a lack of meat as well. Water scarcity, in short, causes starvation to occur en masse for both people and animals that are located in the area.

3. Lack of Education

Water scarcity makes it difficult for people to get the education that they need or that they deserve. Why? Mainly because those children are either too sick to go to school (which we will discuss below) or they are working to help get water to the home and the family.

4. Diseases

If you don’t have clean water access, then you will be more likely to get diseases from the water that you do have. Whether you’re drinking the water or using it for bathing, those diseases will get into the body.

In a number of cases, people are likely to carry bacteria and infect other people. In severe cases, these diseases may cause loss of lives, even spread across borders, which may also lead to pandemics.

5. Sanitation Issues

Since we need water for several tasks of our daily life, without having access to clean water for drinking, cooking, washing or bathing, it usually results in unhygienic conditions for people.

When people are not given access to proper sanitation, diseases (which we talked about above) become much more of an issue than it would have been otherwise. It also causes mental health issues, including depression and anxiety.

6. Poverty

All in all, people who are dealing with water scarcity are often stuck in poverty as well. These people are not able to get the resources that they need to be able to thrive, and instead are just barely surviving through these difficult times.

7. Migration

Water scarcity may also lead to migration waves. When large areas of land may no longer be suitable for living or farming because of water scarcity, millions of people may lose their livelihood due to that. These people may be forced to migrate to other places to survive.

8. Destruction of Habitats

Water is crucial for all life forms on our planet. If water scarcity persists over a longer period, it may also lead to the destruction of whole habitats. Animals and plants may no longer be able to get enough water and may therefore die or have to move to other regions.

10. Loss of Biodiversity

If regions suffer from severe water shortages, some animals may become extinct since they simply starve or die of thirst. Many plants may no longer be able to grow and reproduce in a sufficient manner causing serious biodiversity loss.

GOVERNMENT EFFORTS TOWARDS REDUCTION OF WATER SCARCITY

The Government of India has reformed several of its departments and initiated several water supply projects in the last 3 years to respond to the country's growing water needs. The reforms include -

1. The establishment of a new ministry for water known as the **JAL SHAKTI MINISTRY**. The government also launched several projects in the main rivers and underground water source.
2. In June 2019, Indian Prime Minister Narendra Modi launched a new plan, **"Piped Water for All by 2024"** in order to integrate different water resources management departments together to take charge of the ground and surface water depletion.
3. **Ganga River Cleaning Programs**

   Ganga, a popular holy river in India, feeds millions of people in North India. Despite the heavy reliance of public life on the river, it was named as **one of the 10 most dangerous rivers in the world in 2007 due to water pollution.**

   The first Ganga river cleaning program (Ganga Action Plan) was started in 1985 with an aim to tackle the problem of excessive water pollution in the river. The Modi government announced that it will be launching new projects with more investment along with formulating new policies to manage the pollution in Ganga and other rivers in India.
4. **Non-governmental efforts**

   India has a huge number of Non Government Organisations that focus on solving water shortage problems for the citizens in affected areas.

   Indian organizations such as **'FORCE'** and **'Safe Water Network'** are actively involved in dealing with the water crisis in India.

   International organisations such as '**We are Water**' and **UNICEF** are also very active in alleviating the problems of basic water supply and sanitation in villages.
5. **Raising Social Awareness**

   Most non-governmental organizations consider raising social awareness as one of their main responsibilities. They are actively involved in teaching the locals how to preserve the water resources and how to increase the water usage efficiency by installing new water gathering stations and improving their irrigation techniques.

   'We are Water' publishes documentary films every year broadcasting the severe water scarcity in India to raise social awareness. In its documentaries, We are Water highlights the main reasons for water scarcity in the country and how each civilian can work towards conserving water in their own homes.

6. Establishing Water Resources Projects

A lot of non-governmental organisations in India are involved in establishing water harvesting structures in rural areas.

For example, **villagers in Palve Budruk, near Ahmednagar**, developed a catchment plan covering 1,435 hectares – over 80% of the land available with support from UNICEF. The system consists of 3 dams, 20 canal bunds, two small percolation tanks linked to the main tank and 19 village ponds. Water stored in the percolation tank, is strictly meant for domestic use. Piped water is supplied for an hour a day in the morning, during which families are expected to fill up water for drinking and cooking.

The Jal Bhagirathi Foundation is one of the most prominent non profit organisations in India dealing with the issues of water scarcity in the desert terrains of Rajasthan. The foundation has covered over 550 villages and revived more than 2000 water harvesting structures in the region. The organisation also works actively with schools in the region, providing safe water and sanitation facilities to them. The Jal Bhagirathi Foundation is also actively involved in raising awareness about water conservation and has been awarded numerous awards for its efforts.

EXERCISE

I Short answer type questions :

1. What do you understand by Land Use Change ?

2. In what ways is land used in India ?

3. Give the basic features of Modern Agriculture.

4. Differentiate between Multiple Cropping & Crop Rotation.

5. What is Eutrophication ? How does it affect the aquatic life ?

6. Give any four consequences of water pollution.

7. How has Fukushima Disaster affected Japan ?

8. Name the methods applied by farmers to conserve top soil & sediments.

9. What do you mean by Water scarcity ? In which area is the consumption of water maximum ?

10. Name two each of National & International Non Governmental Organisatios, working for water related issues.

11. Write a short note on The Jal Bhagirathi Foundation.

II Long answer type questions :

1. How does change in Land Use pattern affect the environment and its components ?

2. Explain Modern agriculture and its advantages.

3. Explain with any four examples, the effects of modern agriculture on the environment..

4. Name and explain any five vactors causing water pollution.

5. What strategies can be applied to control water pollution ?

6. Discuss the 2019 Chennai Water Crisis..

7. Explain any five factors which result in scarcity of water.

8. What are the steps taken by the government to reduce scarcity of water ?