Chapter – 6

Environmental legislation

Environmental legislation is the collection of laws and regulations pertaining to air quality, water quality, the wilderness, endangered wildlife and other environmental factors. The umbrella of environmental legislation covers many laws and regulations, yet they all work together toward a common goal, which is regulating the interaction between man and the natural world to reduce threats to the environment and increase public health.

As you might imagine, environmental legislation is a broad topic, mainly because the natural environment encompasses so many different aspects. So, environmental laws need to consider everything, from the air we breathe to the natural resources we rely on to the plants and animals that share this world with us.

To better understand environmental law, let's look at an example. Let's say that an energy company wants to build a coal-burning power plant to create electricity for the community. Where should this power plant be built? What type of pollutants might result from the coal burning, and what measures will need to be taken to control harmful emissions? If the power plant is built at the edge of town to lessen air pollution for the human population, how will this impact lesser species that inhabit the land downwind of the plant? These are all considerations to be evaluated within the scope of environmental law.

Water (prevention and control of pollution) Act 1974

India participated in the United Nations Conference on the Human Environment held in Stockholm in June 1972 to take appropriate steps for the preservation of the natural resources of the earth which, among other things, include the preservation of the quality of air and control of air pollution. Based on the concluding guidelines of this conference, the Water Act was formulated by the government of India in 1974.

The Water Act (1974)

This is an Act to provide for the prevention and control of water pollution and the maintaining or restoring of wholesomeness of water through various management guidelines and restrictions. The act was introduced and incorporated into the Constitution of India in 1974.

One of the prime objectives of this act is carrying out the purposes mentioned above by assigning a set of responsibilities, powers, and functions to the Boards for the prevention and control of water pollution.

The Water Act applies in the first instance to the whole of the States of Assam, Bihar, Gujarat, Haryana, Himachal Pradesh, Jammu and Kashmir, Karnataka, Kerala, Madhya Pradesh, Rajasthan, Tripura and West Bengal and the Union territories.

The act was passed in pursuance of clause (1) of article 252 of the Constitution. Resolutions have been passed by all the Houses of the Legislatures of the States.

The composition of State Board

The State Pollution Control Board (SPCB) once appointed, should consist of the following key members.

- A full-time chairman: A person having special knowledge or practical experience in respect of matters relating to environmental protection having knowledge and experience in administering institutions dealing with such matters, to be nominated by the State Government
- A full-time member-secretary: Possessing qualifications, knowledge, and experience of scientific, engineering or management aspects of pollution control, to be appointed by the State Government.
- Not more than 5 officials to be nominated by the State Government to represent that Government.
- Not more than 5 officials to be nominated by the State Government, from amongst the members of the local authorities functioning within the state.
- Not more than 3 officials to be nominated by the State Government, to represent the interests of agriculture, fishery or industry or trade or any other interest which, in the opinion of the Central Government, ought to be represented.
- 2 persons to represent the companies or corporations owned, controlled or managed by the State Government, to be nominated by that Government.

Functions of the State Board

Highlight functions of the State Pollution Control Board (SPCB) are as follows:

- Plan a comprehensive programme for the prevention, control or abatement of pollution of streams and wells in the State.
- Advise the State Government on any matter concerning the prevention, control or abatement of water pollution.
- Encourage, conduct and participate in investigations and research relating to problems of water pollution and prevention, control or abatement of water pollution.
- Collaborate with the Central Board in organizing the training of persons engaged or to be engaged in programmes relating to prevention, control or abatement of water pollution.
- Inspect sewage or trade effluents, works, and plants for the treatment of sewage and trade effluents and to review plans, specifications or other data relating to plants set up for the treatment of water.
- Evolve methods of utilization of sewage and suitable trade effluents in agriculture.
- Evolve economical and reliable methods of treatment of sewage and trade effluents, having regard to the peculiar conditions of soils, climate and water resources of different regions.

Air (Prevention and Control of Pollution) Act 1981

India participated in the United Nations Conference on the Human Environment held in Stockholm in June 1972 to take appropriate steps for the preservation of the natural resources of the earth which, among other things, include the preservation of the quality of air and control of air pollution. Based on the concluding guidelines of this conference, the Air Act was formulated by the government of India in 1981.

The Air Act (1981)

This is an Act to provide for the prevention and control and abatement of air pollution through various management guidelines and restrictions. One of the prime objectives of this act is carrying out the purposes mentioned above by assigning a set of responsibilities, powers, and functions to the Boards for the prevention and control of air pollution.

The act was introduced and incorporated into the Constitution of India in 1981 laying down guidelines for the preservation of the quality of air and control of air pollution. In contrast to the water act of 1974 which covers only 13 states and union territories of India, the air act extends to the whole of India.

The composition of State Board

The State Pollution Control Board (SPCB) once appointed, should consist of the following key members.

- A full-time chairman: A person having special knowledge or practical experience in respect of matters relating to environmental protection having knowledge and experience in administering institutions dealing with such matters, to be nominated by the State Government
- A full-time member-secretary: Possessing qualifications, knowledge, and experience of scientific, engineering or management aspects of pollution control, to be appointed by the State Government.
- Not more than 5 officials to be nominated by the State Government to represent that Government.
- Not more than 5 officials to be nominated by the State Government, from amongst the members of the local authorities functioning within the state.
- Not more than 3 officials to be nominated by the State Government, to represent the interests of agriculture, fishery or industry or trade or any other interest which, in the opinion of the Central Government, ought to be represented.

- 2 persons to represent the companies or corporations owned, controlled or managed by the State Government, to be nominated by that Government.

Functions of the State Board

Similar to the CPCP, a State Board may also establish or recognize a laboratory or laboratories to enable the State Board to perform its functions under this section efficiently.

Highlight functions of the State Pollution Control Board (SPCB) are as follows:

- Plan a comprehensive programme for the prevention, control or abatement of air pollution and to secure the execution thereof-,
- Advise the State Government on any matter concerning the prevention, control or abatement of air pollution;
- Collect and disseminate information relating to air pollution;
- Collaborate with the Central Board in organising the training of persons engaged or to be engaged in programmes relating to prevention, control or abatement of air pollution and to organise mass-education programme relating thereto.
- Inspect, at all reasonable times, any control equipment, industrial plant or manufacturing process and to give, by order, such directions to such persons as it may consider necessary to take steps for the prevention, control or abatement of air pollution;
- Inspect air pollution control areas at such intervals as it may think necessary, assess the quality of air therein and take steps for the prevention, control or abatement of air pollution in such areas;
- Lay down, in consultation with the Central Board and having regard to the standards for the quality of air laid down by the Central Board, standards for emission of air pollutants into the atmosphere from industrial plants and automobiles or for the discharge of any air pollutant into the atmosphere from any other source whatsoever not being a ship or an aircraft.
- Advise the State Government with respect to the suitability of any premises or location for carrying on any industry which is likely to cause air pollution.

Environmental Protection Act 1986

Environment Protection Act,1986 is an Act of the Parliament of India. In the wake of the Bhopal Tragedy, the Government of India enacted the Environment Protection Act of 1986 under Article 253 of the Constitution. Passed in March 1986, it came into force on 19 November 1986. It has 26 sections and 4 chapters. The purpose of the Act is to implement the decisions of the United Nations Conference on the Human Environment. They relate to the protection and improvement of the human environment and the prevention of hazards to human beings, other living creatures, plants

and property. The Act is an "umbrella" legislation designed to provide a framework for central government coordination of the activities of various central and state authorities established under previous laws, such as the Water Act and the Air Act

Environmental Impact Assessment

Environmental Impact Assessment (EIA) is a process of evaluating the likely environmental impacts of a proposed project or development, taking into account inter-related socio-economic, cultural and human-health impacts, both beneficial and adverse.

UNEP defines Environmental Impact Assessment (EIA) as a tool used to identify the environmental, social and economic impacts of a project prior to decision-making. It aims to predict environmental impacts at an early stage in project planning and design, find ways and means to reduce adverse impacts, shape projects to suit the local environment and present the predictions and options to decision-makers. By using EIA both environmental and economic benefits can be achieved, such as reduced cost and time of project implementation and design, avoided treatment/clean-up costs and impacts of laws and regulations.

Although legislation and practice vary around the world, the fundamental components of an EIA would necessarily involve the following stages:

a. Screening to determine which projects or developments require a full or partial impact assessment study;
b. Scoping to identify which potential impacts are relevant to assess (based on legislative requirements, international conventions, expert knowledge and public involvement), to identify alternative solutions that avoid, mitigate or compensate adverse impacts on biodiversity (including the option of not proceeding with the development, finding alternative designs or sites which avoid the impacts, incorporating safeguards in the design of the project, or providing compensation for adverse impacts), and finally to derive terms of reference for the impact assessment;
c. Assessment and evaluation of impacts and development of alternatives, to predict and identify the likely environmental impacts of a proposed project or development, including the detailed elaboration of alternatives;
d. Reporting the Environmental Impact Statement (EIS) or EIA report, including an environmental management plan (EMP), and a non-technical summary for the general audience.
e. Review of the Environmental Impact Statement (EIS), based on the terms of reference (scoping) and public (including authority) participation.
f. Decision-making on whether to approve the project or not, and under what conditions; and
g. Monitoring, compliance, enforcement and environmental auditing. Monitor whether the predicted impacts and proposed mitigation measures occur as defined in the EMP. Verify the compliance of proponent with the EMP, to ensure that unpredicted impacts or failed mitigation measures are identified and addressed in a timely fashion.

Chapter – 7

Impact of Energy usage on Environment

Environmental pollution is one of the most serious problems facing humanity and other life forms on our planet today. Environmental pollution is defined as "the contamination of the physical and biological components of the earth/atmosphere system to such an extent that normal environmental processes are adversely affected." Pollutants can be naturally occurring substances or energies, but they are considered contaminants when in excess of natural levels. Any use of natural resources at a rate higher than nature's capacity to restore itself can result in pollution of air, water, and land.

Global Warming

Global warming, the phenomenon of increasing average air temperatures near the surface of Earth over the past one to two centuries. Climate scientists have since the mid-20th century gathered detailed observations of various weather phenomena (such as temperatures, precipitation, and storms) and of related influences on climate (such as ocean currents and the atmosphere's chemical composition). These data indicate that Earth's climate has changed over almost every conceivable timescale since the beginning of geologic time and that the influence of human activities since at least the beginning of the Industrial Revolution has been deeply woven into the very fabric of climate change.

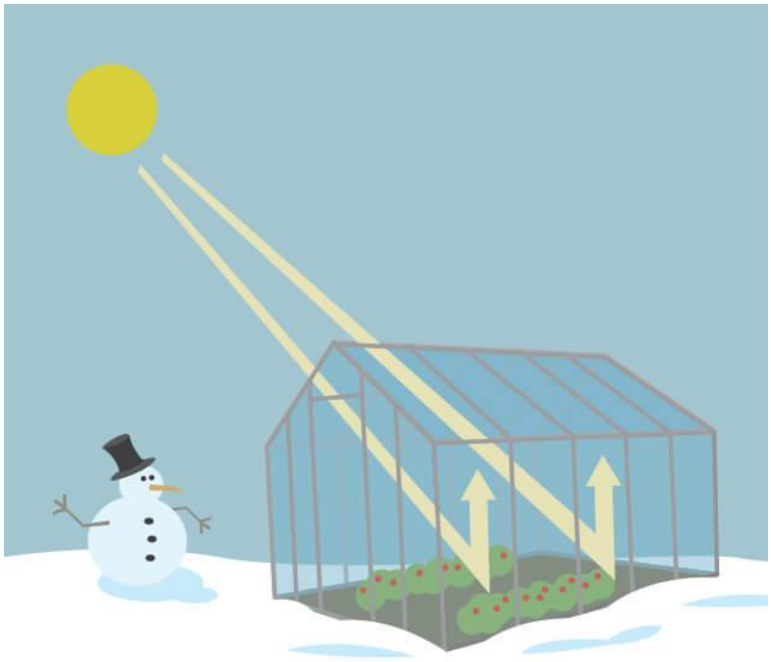
Hence, global warming is the long-term rise in the average temperature of the Earth's climate system. It is a major aspect of climate change and has been demonstrated by direct temperature measurements and by measurements of various effects of the warming. Global warming and climate change are often used interchangeably.

Greenhouse Effect

The greenhouse effect is a process that occurs when gases in Earth's atmosphere trap the Sun's heat. This process makes Earth much warmer than it would be without an atmosphere. The greenhouse effect is one of the things that makes Earth a comfortable place to live.

As you might expect from the name, the greenhouse effect works … like a greenhouse! A greenhouse is a building with glass walls and a glass roof. Greenhouses are used to grow plants, such as tomatoes and tropical flowers.

A greenhouse stays warm inside, even during the winter. In the daytime, sunlight shines into the greenhouse and warms the plants and air inside. At nighttime, it's colder outside, but the greenhouse stays pretty warm inside. That's because the glass walls of the greenhouse trap the Sun's heat.



A greenhouse captures heat from the Sun during the day. Its glass walls trap the Sun's heat, which keeps plants inside the greenhouse warm — even on cold nights.

The greenhouse effect works much the same way on Earth. Gases in the atmosphere, such as carbon dioxide, trap heat just like the glass roof of a greenhouse. These heat-trapping gases are called greenhouse gases.

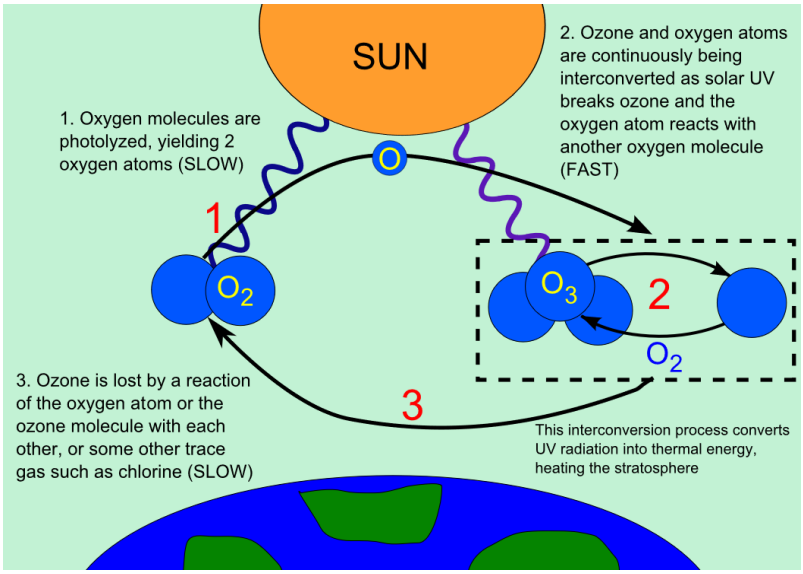
Depletion of ozone layer

Ozone depletion consists of two related events observed since the late 1970s: a steady lowering of about four percent in the total amount of ozone in Earth's atmosphere (the ozone layer), and a much larger springtime decrease in stratospheric ozone around Earth's polar regions. The latter phenomenon is referred to as the ozone hole. There are also springtime polar tropospheric ozone depletion events in addition to these stratospheric events.

In 2019, NASA announced the "ozone hole" was the smallest ever since it was first discovered in 1982.

The main cause of ozone depletion and the ozone hole is manufactured chemicals, especially manufactured halocarbon refrigerants, solvents, propellants and foam-blowing agents (chlorofluorocarbons (CFCs), HCFCs, halons), referred to as ozone-depleting substances (ODS). These compounds are transported into the stratosphere by turbulent mixing after being emitted from the surface, mixing much faster than the molecules can settle.[4] Once in the stratosphere, they release halogen atoms through photo dissociation, which catalyze the breakdown of ozone (O3) into oxygen (O2). Both types of ozone depletion were observed to increase as emissions of halocarbons increased.

Ozone depletion and the ozone hole have generated worldwide concern over increased cancer risks and other negative effects. The ozone layer prevents most harmful UV wavelengths of ultraviolet light (UV light) from passing through the Earth's atmosphere. These wavelengths cause skin cancer, sunburn and cataracts, which were projected to increase dramatically as a result of thinning ozone, as well as harming plants and animals. These concerns led to the adoption of the Montreal Protocol in 1987, which bans the production of CFCs, halons and other ozone-depleting chemicals.



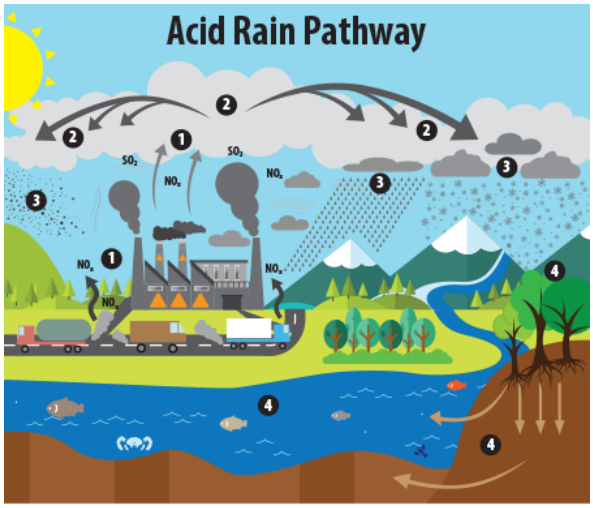
Ozone cycle

Acid Rain

Acid rain, or acid deposition, is a broad term that includes any form of precipitation with acidic components, such as sulfuric or nitric acid that fall to the ground from the atmosphere in wet or dry forms. This can include rain, snow, fog, hail or even dust that is acidic.

What Causes Acid Rain?

Acid rain results when sulfur dioxide (SO2) and nitrogen oxides (NOX) are emitted into the atmosphere and transported by wind and air currents. The SO2 and NOX react with water, oxygen and other chemicals to form sulfuric and nitric acids. These then mix with water and other materials before falling to the ground.



This image illustrates the pathway for acid rain in our environment: (1) Emissions of SO_2 and NO_x are released into the air, where (2) the pollutants are transformed into acid particles that may be transported long distances. (3) These acid particles then fall to the earth as wet and dry deposition (dust, rain, snow, etc.) and (4) may cause harmful effects on soil, forests, streams and lakes.

While a small portion of the SO2 and NOX that cause acid rain is from natural sources such as volcanoes, most of it comes from the burning of fossil fuels. The major sources of SO2 and NOX in the atmosphere are:

- Burning of fossil fuels to generate electricity. Two thirds of SO2 and one fourth of NOX in the atmosphere come from electric power generators.
- Vehicles and heavy equipment.
- Manufacturing, oil refineries and other industries.

Winds can blow SO2 and NOX over long distances and across borders making acid rain a problem for everyone and not just those who live close to these sources.

Carbon Credits

A carbon credit is a generic term for any tradable certificate or permit representing the right to emit one tonne of carbon dioxide or the equivalent amount of a different greenhouse gas (tCO2e).

Carbon credits and carbon markets are a component of national and international attempts to mitigate the growth in concentrations of greenhouse gases (GHGs). One carbon credit is equal to one tonne of carbon dioxide, or in some markets, carbon dioxide equivalent gases. Carbon trading is an application of an emissions trading approach. Greenhouse gas emissions are capped and then markets are used to allocate the emissions among the group of regulated sources.

The goal is to allow market mechanisms to drive industrial and commercial processes in the direction of low emissions or less carbon intensive approaches than those used when there is no cost to emitting carbon dioxide and other GHGs into the atmosphere. Since GHG mitigation projects generate credits, this approach can be used to finance carbon reduction schemes between trading partners and around the world

Eco-friendly Materials:

Eco-friendly literally means earth-friendly or not harmful to the environment (see References 1). This term most commonly refers to products that contribute to green living or practices that help conserve resources like water and energy. Eco-friendly products also prevent contributions to air, water and land pollution. You can engage in eco-friendly habits or practices by being more conscious of how you use resources.

Advantages

- Phenomenal growth in the construction industry that depends upon depletable resources.
- Production of building materials leads to irreversible environmental impacts.
- Using eco-friendly materials is the best way to build a eco-friendly building.

Today many people that are building or remodeling their houses choose to use eco-friendly building materials. An eco-friendly building material is one that increases the efficiency of energy used and reduces impact on human well-being and the environment.

There are many different materials that can be used that are eco-friendly; from foundation, to insulation, to interior and exterior wall finishes, flooring, and countertop materials.

Categorization of Building Materials

1. Civil materials

2. Waterproofing and Chemical additives
3. Paving, flooring, dado and similar finishes
4. Paints, colors, white washing, distempering and wood finishes
5. Wood work
6. Roofing and ceiling
7. Doors and windows
8. Water supply and sanitary fittings
9. Electrical works
10. Fire fighting system
11. Miscellaneous
12. Excavation work
13. Road works

Recycling of materials

Recycling saves energy (almost 70% less energy is required in recycling) and money, so it is the most economic process. Industrialists are focusing on making the products that can be recycled later. A great percentage of materials are being recycled and are being used as households and their number is increasing day by day. The most important recyclable materials are:

1. Plastic recycling: Many plastic products and bags are in use nowadays. Plastic recycling serves as a solution to the earthly pollution. Plastics are polymers and are resinous and they are melted down to make other products. Most importantly plastic container like water bottles, beverage containers, milk bottles, soap boxes etc. are recycled. Along with it grocery bags and plastic sacks are also recycled.

2. Electronics recycling: In this world of technology where the gadgets are rapidly advancing and each new gadget has features different from the old ones, so people buy new gadget as soon as it appears in the market. The question arises: what to do with the old electronic? They should be given to other people so that the cycle continues.

Electronics have some toxic and explosive matter in them and they have to be disposed of properly. So rather than throwing them, we should get them recycled and let their explosive matter be removed. All the electronics like televisions, monitor, printers, keyboards, scanner, cell phones, fax machine etc. are recycled.

3. Clothing and paper recycling: Clothes are recycled in industries on a great scale and quality need not to be compromised. Brand new and good quality clothing is made from old clothing. Similarly, paper products are recycled to save deforestation and pollution.

4. Vehicles: Big and expensive vehicles are recycled in industries which assist the economy a lot

5. Batteries recycling: Rechargeable batteries can be recycled only. The batteries are first separated from their plastic and insulation coverings then they are heated in large furnaces and large energy is consumed.

6. Aluminum cans recycling: Aluminum cans are used for preserving or canned food. As they are in great use now, so they occupy a great part of the waste. There is a great need of recycling them which not only reduces land pollution but is also an energy saver.

Rainwater harvesting

Water is, undoubtedly, the top natural resource you need for your home use. It's glamorous to possess a stockpile of guns, gold, and jeweler, but without water, life might prove to be unbearable. Water shortages are sometimes inevitable, and so if you're not prepared for the eventuality, you might find yourself between a rock and a hard place. The best and cheapest alternative to the traditional water supply systems is rainwater harvesting. However, to be able to harvest rainwater, you'll need to install a rainwater harvesting system.

We all take water for granted. It is one of those natural resources that most people do not put a lot of thought into, but in order to continue enjoying that free supply of water for many more years,

changes must be made. Rainwater harvesting is the process of collection of rainwater from surfaces on which rain falls, filtering it and storing it for multiple uses. Rainwater harvesting puts the supply of water back to normal levels. It is the collection and storage of water from surfaces that rain has fallen upon.

Rainwater harvesting is an innovative technique utilized to harvest rainwater from roofs and other above surfaces to be stored for later use. Rain harvested water can be used for garden and crop irrigation, watering livestock, laundry, and flushing toilets. However, you cannot use harvested rainwater for showering, bathroom sink or kitchen use because it's not really fit for consumption.

In a normal scenario the rainwater is collected from roof buildings and then stored inside of a special tank. Rainwater harvesting systems are designed after assessing site conditions that include rainfall pattern, incident rainfall, subsurface strata and their storage characteristics. Rainwater harvesting is popular all across the world, although in countries that are very dry, such as Australia, it is even more popular.

Rainwater harvesting

Rainwater can be harvested and used by those in the city who have running city water just as well as it can be used by those in more rural towns where adequate water supply may be unavailable. It is simple to replace many things that you are using regular city water with rainwater and enjoy numerous benefits when you do. Not only it helps you to conserve water but can also help you to save energy as the need to maintain centralized water system can be bypassed.

If you are worried about your roof being dirty, put that fear to the side. Many different tools are available to help you easily clean your roof. Hiring a roofer to com provide you with a cleaning is another option that you will have available.

Individuals are driven to harvest rainwater because of a wide range of factors such as unpredictable weather patterns, enhanced costs of infrastructure and explosion of water consumption. On top of that, most businesses and homes are looking to embrace green practices to become efficient and a lot more self-reliant. In this case, rainwater presents the obvious choice because it is the easiest and quickest method to minimize water consumption. Most homeowners that have embraced this practice have reported a reduction of about 50% in water bills. On top of helping to reduce water bills, rainwater harvesting helps the environment a lot.

Maintenance of groundwater

Ways to Protect and Conserve Groundwater

1. **Go Native**

   Use native plants in your landscape. They look great, and don't need much water or fertilizer. Also choose grass varieties for your lawn that are adapted for your region's climate, reducing the need for extensive watering or chemical applications.

2. **Reduce Chemical Use**

   Use fewer chemicals around your home and yard, and make sure to dispose of them properly - don't dump them on the ground!

3. **Manage Waste**

   Properly dispose of potentially toxic substances like unused chemicals, pharmaceuticals, paint, motor oil, and other substances. Many communities hold household hazardous waste collections or sites - contact your local health department to find one near you.

4. **Don't Let It Run**

   Shut off the water when you brush your teeth or shaving, and don't let it run while waiting for it to get cold. Keep a pitcher of cold water in the fridge instead.

5. **Fix the Drip**

   Check all the faucets, fixtures, toilets, and taps in your home for leaks and fix them right away, or install water conserving models.

6. **Wash Smarter**

Limit yourself to just a five minute shower, and challenge your family members to do the same! Also, make sure to only run full loads in the dish and clothes washer.

7. **Water Wisely**

   Water the lawn and plants during the coolest parts of the day and only when they truly need it. Make sure you, your family, and your neighbors obey any watering restrictions during dry periods.

8. **Reduce, Reuse, and Recycle**

   Reduce the amount of "stuff" you use and reuse what you can. Recycle paper, plastic, cardboard, glass, aluminum and other materials.

9. **Natural Alternatives**

   Use all natural/nontoxic household cleaners whenever possible. Materials such as lemon juice, baking soda, and vinegar make great cleaning products, are inexpensive, and environmentally-friendly.

10. **Learn and Do More!**

    Get involved in water education! Learn more about groundwater and share your knowledge with others.

Concept of Green Buildings:

Green building is a whole-systems approach for designing and constructing buildings that conserve energy, water, and material resources and are more healthy, safe, and comfortable.The reality is that environmentally sustainable building goes far beyond energy consumption. Building materials and use of landfills during construction can have detrimental effects on volunteers, home owners and the environment. Green building offers a response to the realization that the way we have been building everything from houses to skyscrapers is not sustainable. Many health problems today stem from, or are aggravated by poor indoor air quality and exposure to toxic substances contained in commonly used building products. Green building practices can eliminate these health damaging conditions.

Benefits:

Adopting even one or two green strategies can have significant benefits for the home owner as well as for the environment:

a. Energy efficiency is one of the primary advantages of green building. Energy consumption can be dramatically slashed. Below are a few of the strategies that go into making a house exceptionally energy efficient.

b. Orient the house to reduce solar gain in summer and capture the sun's light and warmth in winter.

c. Carefully sized overhangs or awnings will protect windows from the summer sun while admitting the sun's warming rays in winter when it is at a lower angle known as a ground-source heat pump system, consumes no fossil fuels at all, and provides outstanding performance year-round with an extraordinarily low operating cost.

d. Maximize natural light to reduce the need for electrical usage during the day

e. Compact fluorescent lights (CFL's) are big energy savers. Incandescent bulbs are highly inefficient, converting just 10% of the energy they use into light — the other 90% produces only heat. GEL's are up to six times more efficient and last up to ten times longer. Choose CFL's with warm color temperatures (around 2, 7000 to 3,000° Kelvin) which are indistinguishable from incandescent lights.

f. Cut energy consumption further with clean, renewable energy from photovoltaic panels. During periods when the panels produce more power than the house is using, the electric meter will actually run backwards. In some locales, wind generated electricity is also an option

g. All newly built homes to produce more energy than they consumed by 2020. Renovate all existing buildings to save energy. Ban incandescent light bulbs by 2010. Reduce green house-gas emissions by 20% by 2020.

h. Increase renewable energy from 9% to 20-25% of total energy consumptions by 2020.

i. Bring transport emissions back to 1990 levels. Reduce vehicle speed limits by 10 kilometers per hour. Taxes and incentives to favour clean cars. Shift half of haulage by road to rail and water within 15 years. Develop rail and public transport.

The following are considered in designing green buildings:

Design an energy-efficient building:

Use high levels of insulation, high- performance windows, and tight construction. In southern climates, choose glazing's with low solar heat gain.

Design buildings to use renewable energy:

Passive solar heating, day lighting, and natural cooling can be incorporated cost-effectively into most buildings. Also consider solar water heating and photovoltaic-or design buildings for future solar installations.

Optimize material use:

Minimize waste by designing for standard ceiling heights and building dimensions. Avoid waste from structural over-design (use optimum-value engineering/advanced framing). Simplify building geometry. Design water-efficient, low-maintenance landscaping: Conventional lawns have a high impact because of water use, pesticide use, and pollution generated from mowing. Landscape with drought-resistant native plants and perennial groundcovers.

Mote it easy for occupants to recycle waste:

Make provisions for storage and processing of recyclables—recycling bins near the kitchen, under sink compost receptacles, and the like. Look into the feasibility of gray water: Water from sinks, showers, or clothes washers (gray water) can be recycled for irrigation in some areas. If current codes prevent gray-water recycling, consider designing the plumbing for easy future adaptation.

Design for durability:

To spread the environmental impacts of building over as long a period as possible, the structure must be durable. A building with a durable style (“timeless architecture”) will be more likely to realize a long life.

Design for future reuse and adaptability:

Make the structure datable to other uses, and choose materials and components that can be reused or recycled.