ENVIRONMENTAL LITERACY NOTES

UNIT CODE:

This unit addresses the unit standard: **Demonstrate environmental literacy**

Duration of Unit: 40 hours

Unit Description

This unit describes the competencies required to control environmental hazard, control environmental pollution, comply with workplace sustainable resource use, evaluate current practices in relation to resource usage, identify environmental legislations/conventions for environmental concerns, implement specific environmental programs, monitor activities on environmental protection/programs, analyze resource use and develop resource conservation plans.

Summary of Learning Outcomes

1. Control environmental hazard
2. Control environmental Pollution
3. Demonstrate sustainable resource use
4. Evaluate current practices in relation to resource usage
5. Identify Environmental legislations/conventions for environmental concerns
6. Implement specific environmental programs

PREPARED BY: FELIX BIKETI

DEPARTMENT OF ENGINEERING TECHNOLOGY

TOPIC ONE

ENVIRONMENTAL MANAGEMENT AND CO-ORDINATION

An Act of Parliament to provide for the establishment of an appropriate legal and institutional framework for the management of the environment and for matters connected therewith and incidental thereto

WHEREAS it is desirable that a framework environmental legislation be promulgated so as to establish an appropriate legal and institutional framework for the management of the environment;

WHEREAS it is recognised that improved legal and administrative coordination of the diverse sectoral initiatives is necessary in order to improve the national capacity for the management of the environment;

WHEREAS the environment constitutes the foundation of national economic, social, cultural and spiritual advancement;

Safe Storage of Hazardous Waste Materials

Proper storage and handling of hazardous waste containers is an important practice that not only promotes a safe work environment, but also ensures you're following legislative requirements.

1. Weather-resistant labels should be prominently displayed that indicate the name of the hazardous waste. Follow all (**Workplace Hazardous Materials Information System)** WHIMIS, Safety and Legislative guidelines.

2. Sealable containers that prevent release of contents and prevent other substances from entering the containers should be used.

3. Storage containers that are compatible with the type of waste stored, and are made of durable, weather- and corrosion resistant materials should be used.

4. Wastes should be stored in an area that is inaccessible to unauthorized persons, clearly identified as a hazardous waste storage area, and designed to prevent secondary

containment.

5. Secondary containment system should be implemented for all containers used to store hazardous wastes, and for all equipment used in transporting hazardous wastes that are in a liquid or gas form.

6. The amount of hazardous waste should be limited on-site by continually monitoring your hazardous waste volume.

7. All employees should be ensure adequately trained on the handling and storage of your hazardous waste. This should include emergency response training.

8. Hazardous waste contingency plan should be kept up-to-date, including current contact information for the facility owners or operators as well as procedures to follow in the event of an emergency

Disposal of Hazardous Waste

1. **The use of Incineration by burning the material in high temperatures is a great way to destroy toxic waste**. Incineration actually destroys and terminates most HHW. A benefit of society using this method is the fact that the flammable wastes can also be burned and used as energy sources. The method of Incineration releases toxic gases which can affect the environment, but current technology has developed more effective incinerator units that limit the amount of emissions released in the sky.
2. **Another smart method is to recycle.** You ever see the cell phone recycling units in Staples or an Office store. Well, the point of that is to recycle or reclaim the battery and parts off the phone rather than just disposing them. Used oils can also be salvaged and recycled. Recycling is the best method for the environment and is really a "no-brainer"!
3. **Find out what hazardous waste collection facilities are in your area**! Many times, communities will designate special days for collection. If you are in immediate need of proper hazardous waste disposal, you can contact your local government or head over to your local municipal building where they should be able to help you.

4. **If you have diabetic syringes or prescription drugs, you should be very careful about how you dispose of them**! Most pharmacies carry a mini disposal box where you can throw away used syringes. Prescription drugs should always be handed off to a drop-off location! They should never be thrown in the trash or flushed down the toilet or sink!
5. **The last, but not least way to dispose of hazardous waste is to share it!** For instance, if you have extra oil or fertilizer lying around you can share it with a person who is need!

Types of PPE

Selecting the right **PPE** to sufficiently reduce exposure to hazards is essential to laboratory safety.

PPE will be classified into categories:

I. Head protection,
II. Hand protection,
III. Eye and face protection,
IV. Respiratory protection
V. Hearing protection
VI. Foot Protection
VII. Body protection,
VIII. Height and access protection

I. Head protection

Wearing PPE for head protection will help you avoid any harm that may come to you from falling materials or swinging objects. Moreover, the head protectors are designed to protect you from knocking against stationary objects. Some kinds of head protection equipment (e.g. caps and hair nets) can even protect against entanglement or scalping on machinery.

Examples of head protection equipment:

- Helmets;
- Hard hats;
- Bump Caps;
- Guards;
- Accessories.

Examples of activities where you may need head protection:

- Workplace related: construction or building repair (e.g. renovation, restoration, etc.) and work in tunnels or excavations;
- Leisure/Sport related: driving motorcycles.

II. Hand protection

Arms, hands and fingers are often injured and, therefore, it is vital to wear hand protection equipment when it is required. The hand protection equipment can ensure protection against heat, cold, vibrations, burns, cuts by sharp objects, bacteriological risks and chemical contamination.

Examples of hand protection equipment:

- Work gloves and gauntlets;
- Wrist cuff arm nets.

Activities requiring hand protection equipment:

- construction and outdoor work;
- working with vibrating apparatus;
- working in hot or cold environments;
- working with chemicals and hazardous elements;
- manual handling of abrasive or sharp objects.

III. Eye and face protection

Numbers are scary! Every day, 600+ workers worldwide suffer from eye injuries. Such injuries can be avoided simply by wearing the proper eye and face protection equipment. As examples of such PPE can be mentioned the following ones:

- Safety glasses and goggles;
- Eye and face shields;
- Eyewear accessories;
- Over specs;

- Visors.

You are encouraged and advised to wear eye and face protection equipment when:

- working with lasers or power driven tools;
- using gas or vapour under pressure;
- performing welding operations;
- handling hazardous substances.

IV. Respiratory protection

The respiratory protection covers a broad group of PPE: breathing apparatus, full face or half mask respirators, powered respirators, protective hoods, disposal face masks, detectors, monitors, etc. Adequate training on how users should use the equipment is always required.

This type of PPE must be present when being in contact with large amounts of gases, powders, dust and vapours.

V. Hearing protection

The hearing protection equipment is vital when working in an environment with high-sound levels. The type of hearing protection should not only be suitable for the working environment but also provide a level of hygiene and comfort to the users. A good practice is to provide employees with a range of protectors and then allow them to select the ones which suit them the best.

Examples of hearing protection equipment:

- Earplugs and defenders;
- Noise meters;
- Communications sets;
- Acoustic foam.

VI. Foot protection

The foot protection equipment is designed to protect the feet and legs against various hazards, such as extreme temperatures, crushing, piercing, slipping, cutting, chemicals and electricity. It is typically required when users are involved in construction activities, working in very cold or hot environments, working with chemicals and forestry, or when manually handling heavy objects.

As examples of foot protection equipment can be pointed out the following ones:

- Safety boots and shoes;
- Anti-static and conductive footwear.

VII. Body protection

Usually, body protection equipment is required in the following cases:

- For protection against weather conditions when working outdoors;
- Ensuring the high-visibility of users when they work in areas where there is a mixed vehicle (e.g. bikes, motors, cars and busses) and pedestrian traffic;
- For users' protection against extreme temperatures;
- Ensuring protection against entanglement, drowning, chemical contamination, etc.

Examples of body protection equipment:

- Life jackets;
- Clothing for specific weather conditions;
- High-visibility clothing;
- Harnesses, and others.

VIII. Height and access protection

This type is highly specialised, and it usually requires users to undergo thorough training before they are allowed to use it. The height and access protection equipment must be inspected periodically by a competent person to ensure it is still fit for use and the health and safety of users is not threatened in any way.

As examples of height and access protection equipment can be mentioned the following ones:

- Fall-arrest systems;
- Body harnesses;
- Lowering harnesses;
- Rescue lifting;
- Energy absorbers, and others.

The **Occupational Safety and Health Standards** was formulated in 1978 in compliance with the constitutional mandate to safeguard the worker's social and economic well-being as well as his physical safety and health. Adopted through the tested democratic machinery of tripartism, the 1978 Standards is considered as a landmark in Philippine labor and social legislation.

ASSIGNMENT

Briefly write short notes on the purposes and content of Environmental management and cooperation act 1999

TOPIC TWO

CONTROL ENVIRONMENTAL POLLUTION

Resources

Resource are anything that adds value to life such as water, food, plants, animals, minerals, metals, and everything else that exists in nature and has utility to mankind is a 'Resource'. The value of each such resource depends on its utility and other factors. For example, metals are gold, silver, copper or bronze have economic value; i.e. they can be exchanged for money. However, mountains, rivers, sea or forests are also resources but they do not have economic value.

There are two most important factors that can turn any substance into a resource- time and technology. With the help of technology, innovation humans can transform a natural or man-made substance into a resource. Like, minerals, fish or other marine creatures sourced from the sea can be used for our food and medicines. Similarly, time also adds to the value of a resource. For example, fossil deposits of organisms over hundreds of years can turn into fossil fuels.

1. Natural Resources

Anything and everything that is available naturally on earth is a natural resource. We can further divide them into:

i. Biotic & Abiotic

Any life form that lives within nature is a Biotic Resource, like humans, animals, plants, etc. In contrast, an abiotic resource is that which is available in nature but has no life; like metals, rocks, and stones. Both biotic and abiotic resources can be renewable or non-renewable.

ii. Renewable & Non-renewable

Renewable resources are almost all elements of nature which can renew themselves. For e.g. sunlight, wind, water, forests and likewise. While, non-renewable resources, are limited in their quantity. Like fossil fuels and minerals. Though these resources take millions of years to form, they would eventually get over within our lifetime if we use continuously.

iii. Potential, Developed, and Stock Resources

Natural elements which are already easily available but humans are yet to discover their real power are **Potential resources**. For example, solar and wind energy are two natural resources, which have a high potential for human life. Though we are using it, we can use these even more in the future once we understand their true potential.

In contrast, a **developed resource** is that which humans have discovered and developed over a long time. Most of the water, fossil fuel, minerals, plants and animals that we use for our need today, are developed resources.

There are some resources present in nature, which have enough potential, but we do not have adequate knowledge or technology to develop it. As a result, these remain in nature as **stock resources**. For example, Hydrogen and Oxygen gases can be used as rich sources of energy but we still do not know how.

2. Man-Made Resources

When humans use natural things to make something new that provides utility and value to our lives, it is called human-made resources. For instance, when we use metals, wood, cement, sand, and solar energy to make buildings, machinery, vehicles, bridges, roads, etc. they become man-made resources. Likewise, technology is also a man-made resource. Man-made resources are mostly renewable. One can re-build a building or fixed a broken machine.

And, because humans have the skills, intelligence, and knowledge, and use technology to transform a natural resource into usable and valuable things, they themselves become a resource. That is what we know as Human Resource.

Resource Conservation

All human-made resources are dependent on the availability of the natural resource/s. We need to understand the value of each natural element and then need to conserve those resource/s. Because we should be able to use them throughout our lifetime and also save them for our future generations.

For example, if we do not start saving water, very soon, human society will start facing severe scarcity of water. Likewise, if we cut down all forests, eventually, there would be no wood left for us to build homes or make fire. It will also increase the level of carbon dioxide. As a result, it will only harm human life. In other words, conservation of resources is necessary for the betterment of human life.

By carefully utilizing each natural resource and allowing it to renew itself within nature, we can help in resource conservation. We must also focus on sustainable development- a way of optimally using and balancing the use of each resource. And, by doing so, we can all contribute to a healthy and resourceful planet.

Questions:

Q1. What is sustainable development?

Ans. Sustainable economic development refers to 'development of resource/s without causing any harm to the environment. And, such development should not compromise with the needs of future generations.

Q2. How can you divide resources?

Ans. A resource can be – Natural and Human-made. Also, natural resources can be –

- Biotic and Abiotic
- Renewable and Non-renewable
- Potential, developed and stock

The Challenge

Kenya is using ever more of the world's resources, and is now more dependent on imported resources than any other global region and yet we're also throwing away over 5 billion Kenya's worth of valuable resources every year. The Earth's ability to sustain humanity's increasing rate of consumption is being pushed to the limit. Kenya is playing a massive role in degrading the natural environment on which we all depend. Kenya's dependence on imported resources makes it economically vulnerable, and the extraction and processing of these resources have adverse impacts on people and the environment. The economic dangers of excessive resource use were demonstrated just before the financial crisis in 2008, when rapid growth in the global economy led to soaring prices of many commodities (including products linked to land, such as food). Kenya needs to use resources far more efficiently to make our economy more resilient to fluctuations in the price and availability of resources. There is now widespread agreement, particularly from the business community, on the need to become more resource efficient. Yet Kenya doesn't measure how much resources it uses, nor does it set any targets or assess whether policies improve resource efficiency. Kenya should also devise long-term targets and strategies in order to reduce our use of the world's resources.

Why is resource use important?

Natural resources are the foundation of our economy and our society. Without them neither could function. Nature provides humans with all the resources necessary for life, including:

- Land, on which we grow food and other crops that we use for building materials and energy.
- Mined materials, to extract metals or fuels.
- Water for crops, animals and humans.
- A stable climate, clean air to breathe and predictable weather conditions.

As global standards of living increase, and the population rises, we are making ever-higher demands on the planet. This is leading to competition for resources between different regions. There is also competition over uses of resources, for example whether land is used for food, fuels

or biodiversity. The result of these pressures is, among other things, rising prices for resources, which have a particularly serious impact on the poorest people.

Resource use: a key sustainability issue

Our consumption of natural resources includes not just the physical materials that are extracted but also the global ecosystems, services and cycles that regulate conditions on the planet. The concentration of carbon in the atmosphere – leading us towards dangerous climate change – is perhaps the most obvious environmental limit that humanity is facing. But this is not the only ecological crisis that our consumption of the Earth's resources is driving. Others include:

• Forests are being cleared for animal feed and fuel crops such as soya and oil palm.

• Ecosystems and habitats are increasingly imperiled by pollution from industry, extraction and dumping.

• The oceans are being emptied of fish far faster than they can replenish themselves.

The impacts of resource use on people

The over-use of natural resources not only affects the environment, but people too. In Indonesia, for example, palm oil production has resulted in human rights abuses, leaving many indigenous communities without land, water or adequate livelihoods. Some oil palm companies – often with the collusion of the police and authorities – use violent tactics to grab land from indigenous communities. Previously self-sufficient families end up locked into debt and poorly paid work, struggling to afford education and food. They lose the goods and services, such as food, materials, and medicine that the forest previously provided. Pollution from pesticides, fertilizers and the pressing process is leaving some villages without clean water. The competition between biofuels and other uses of land can also lead to increases in food prices, which affects the ability of the poor to afford a decent diet. It's not only people in developing countries who suffer from increasing prices of resources. Tackling this problem requires ensuring people can afford to pay for heat and light, but also helping them reduce their energy consumption through energy efficiency. In other words, a vital part of the solution to fuel poverty is more efficient use of resources – the resource in this case being fuel.

The Kenya does not currently measure its total use of resources, which makes it difficult for targets to be set or policies to be evaluated. A 2009 study by Friends of the Earth) in Vienna

looked at how to measure Kenya's use of resources in a way that is achievable and comprehensive. It concluded that the best way would be to use four indicators:

- Land (in hectares), including land used outside the Kenya (for example to grow crops for food or energy sources).

- Material (in tonnes), including those used to make products that are imported into Kenya (sometimes called the material rucksack of products). Data sources allow this figure to be broken down into different forms of materials, for example biological and mineral resources.

- Water (in litres), including water used outside the KENYA to produce imported products (eg cotton).

- Greenhouse gas emissions created by Kenya's consumption (in CO2 equivalent), which includes both Kenya's emissions, and the carbon footprint associated with imported products.

These indicators already exist in research literature, and they are all quite transparent, measuring clear physical quantities. The indicators do not directly measure impacts on biodiversity. But they can be used to highlight issues that need to be investigated. For example, if a new policy such as a biofuel target or reform of the Common Agricultural Policy results in a measurable big increase in Kenya land use, then there should be further investigation. Nor do the indicators address issues of hazardous chemicals or pollution; but it has been found that specific regulation (such as the REACH chemicals policy) is more effective in this area.

TOPIC THREE

DEMONSTRATE SUSTAINABLE RESOURCE USE

Benefits of minimizing wastage

While it is obvious that waste minimization supports sound business and economic practices in addition to protecting the environment, other benefits include the following:

Improved product quality – New technological practices and innovation will not only reduce the generation of waste but also contribute to improved input quality that translates to improved products.

Economic benefits – Efficiency in product use translates to reduced costs when purchasing materials, thus significantly affecting financial performance.

The efficiency of production practices – Waste minimization will attain more output of the product for every part of raw material.

Environmental responsibility – eliminating or minimizing the generation of waste will make it easy for you to achieve environmental policies, standards and regulations.

Public image – Embracing waste minimization will boost the reputation of your company, as it is a reflection of proactive movement in the quest to protect the environment.

New customers –People love to buy their goods from companies that are dedicated to improving our environment. Some consumers exclusively seek these organizations out, so you have an opportunity to reach a wider audience. It brings in new customers and generates new money. This is due to your commitment to protecting the environment.

Fewer Accidents – It reduces the occurrence and likelihood of worker exposure and workplace accidents.

Protect the environment – Waste minimization increases the efficiency of production. You are able to reduce carbon, air, and water emissions while you work to conserve natural resources. Thus it saves resources and energy, reduces pollution, and diminishes demand for landfill space. All these boost environmental performance.

Stay ahead of the competition – Reducing waste both in the final product and the manufacturing process, decreases regulatory burdens associated with disposal. More time and money allow you to invest in new ideas and products.

3 R's of Waste Minimization

Waste minimization revolves around three R's as follows:

Reduce

This calls for using resources that are just enough to cater to your needs, for instance, building a smaller house. This is an effective way of conserving resources as it also lowers the costs. This can be achieved through attaining accuracy when ordering to ensure that there is no waste or no material is sitting on the site for long periods that it is damaged.

Reuse

Here, you will do well to reuse existing materials and buildings, effectively reducing the need for resources while lowering waste volumes and saving money. A huge percentage of resources are incorporated in the construction of homes owing to the mixed materials that are used, yet the end destination for most of them is landfill.

Thus, renovating a house is a much better option than bringing it down to put up another one because a negligible fraction of the old house may be reused/recycled.

Recycle

Using leftover resources or those resources that have reached the end of their life minimizes the need for new materials as well as lowers the volume that ends up in landfills. Thus, it is advisable to use materials that are recyclable as this creates a market for the resources that are recycled while also raising the price that recyclers pay for resources that are recovered even as the recycling viability increases.

Methods for minimizing wastage

1. Optimization of resources

In order to reduce the quantity of waste that is produced by individuals or organizations calls for the optimization of raw materials used in production. For instance, a dressmaker will do well to arrange the pieces of pattern in a certain way along the length of the fabric to use a small portion of the fabric.

2. Scrap metal reuse

Incorporating scraps into the initial stages of manufacturing is a surefire way of ensuring that they do not end up in landfills as waste products. A majority of industries embrace this process, effectively returning rolls that are damaged to the initial production line and in the manufacturing of offcuts, plastic items so that scrap is re-incorporated in the new commodities.

3. Quality control improvement and process monitoring

Measures can be put in place to control the number of rejects and ensure it is at a minimum. This may be achieved through increased frequency of inspection as well as increasing the number of inspection points. For instance, the installation of a continuous monitoring device that is automated will help in identifying production problems before they get to an advanced stage.

4. Exchange of Waste

Here, the waste products from one process are used as raw materials for other processes. Exchange of waste is another means of minimizing waste disposal volumes, especially for waste that may not be eliminated.

5. Shipping to the point of use

Here, raw materials as well as other components are directly delivered at the point of assembly or manufacturing plant ostensibly to minimize handling and use of enclosures and protective wrappings.

6. Zero waste

This systems approach is designed to eliminate waste from the source as well as at every point of the supply chain to ensure that no waste is produced. This design philosophy places emphasis on waste prevention and not waste management at the end of the production line.

7. Reduce the Use of Packaging Materials

Start with reducing the use of packaging materials like shrink wrap by redesigning packages to use recyclable or degradable materials. This redesign will not only allow your company to hone in on a newer look and feel but also ensuring your packages do not end up in a landfill. Even if they reach the landfill, you will be happy to know that your material will degrade without causing any harm to the environment.

8. Reduce Harmful Wastewater

Implement a strategy at your facility to reduce the wastewater and industrial sludge that is a byproduct of manufacturing while also reducing the amount of water used during this process since these materials are hard to treat and dispose of. Decreasing the amount of wastewater and sludge will help save money while disposing of the waste properly. Additionally, you will help conserve natural resources and reduce the potential for environmental contamination.

9. Hold Your Employees Accountable

In order to reduce the amount of waste your employees generate, hold your employees accountable to this as well. You can devise a plan that will encourage employees to be environmentally mindful both in and out of the workplace. For example, praise and reward employees that bring their own reusable mugs, cups, plates, and flatware instead of using single-use tableware. In this way, your organization can make the claim that you have made significant steps towards a greener future.

10. Update Your Recycling Program

Another step is to improve your own recycling program. Help employees to get into the habit of properly disposing of materials by creating an internal goal for every month. This goal can be based on the amount of waste your employees or departments recycled, and if they meet the goal, reward them in some way to encourage them to keep up the good work.

You can also place specially designed bins in the higher traffic areas and clearly label each one.

11. Waste Minimization for Households

Households can practice waste minimization by employing various techniques. One of the ways to achieve this is by purchasing adequate sizes and amounts of food. Purchasing large containers of paint when taking small decorating jobs or purchasing large volumes of food than you need, will result in wastage. For instance, where cans or packs may be thrown, the remains of the containers should be Home composting, thoughtful use of electricity as well as reducing the number of car journeys is also a great way of waste minimization. Generally, buying fewer products or products that last longer, mending worn or broken equipment or clothing, can also minimize household waste. Additionally, households can also minimize wastage of water and cycle or walk to various destinations as opposed to using cars, thereby saving on fuel.

Overall, the personal waste reduction will have an effect on the general waste volumes. Consumers may also shun products without eco-labeling.

12. Waste Minimization in Building Construction

An assessment of streams of waste shows that energy savings may be achieved at minimal cost or no cost within the construction sector. Consequently, the environmental impact of materials may be reduced significantly with reuse.

While at it, it is important to ensure you work with the concerned authorities that include local councils, regional waste authorities, landfill operators or waste recycling contractors. Some of the construction materials that may be recycled include steel, aluminum, gypsum plasterboard, timber, concrete, glass, carpet, plastics as well as bricks and tiles.

It is important to put in place waste minimization strategies that have been agreed upon by both parties. A team approach is highly effective in reducing waste.

13. Assess Your Processes

Lastly, always conduct a waste assessment at your facility. This requires examining what waste is generated and how that waste is managed throughout your facility. The technical evaluation also determines whether a proposed Waste Minimization option will work for the specific

application. It will help to find new opportunities for waste reduction and cost savings. removed to allow for recycling of the container.

Waste management procedures

There are three steps necessary to properly manage waste:

- *Identify Wastes*
- *Evaluate Waste*
- *Manage Wastes*

1. Identify Wastes

There is need to identifying the type of waste produced and using the appropriate management system so as to provides safe, effective, and efficient waste management services for managing nonhazardous solid waste, recyclable waste, and hazardous waste.

2. Evaluate Waste

The community must evaluate their waste for its physical, chemical, and biological characteristics to determine how it is to be properly managed.

A waste may be:

1. Recyclable material (e.g., paper, soda cans)
2. Compostable organic waste (e.g. food, animal bedding, biodegradable plastics)
3. Non-hazardous solid waste
4. Hazardous radioactive waste: containing or contaminated with a radioactive isotope
5. Hazardous biological waste: containing or contaminated with an infectious or potentially infectious agent, a biological toxin, animal carcasses, genetically modified organisms, recombinant DNA, etc.
6. Hazardous chemical waste: waste chemicals, products which are chemical in nature (cleaning agents, paint, motor oil, and pharmaceutics), products that contain chemicals (fluorescent lamps, thermometers), or materials contaminated with chemicals (contaminated soil or rags)
7. Otherwise Regulated Material: asbestos, car batteries, contaminated soil, and construction debris

3. Manage Wastes

Once wastes have been identified and evaluated, the community must manage it according to applicable waste management instructions. These waste management instructions have been developed to be in compliance with all applicable laws and regulations and to promote a safe and healthy workplace.

Methods Used for Conserving Resources

1. Material Substitution:

There are many possibilities of material substitution by which, the use of a material resource can be restricted by finding an alternative resource. The problem in this is that many materials have extensive uses and also joint uses.

Copper sheet can be substituted by aluminium, which at the same time would reduce demand for soldering agents made from and lead. Aluminium is being extensively substituted for tin, particularly, in the production of metal cans and containers. Plastics are being used for insulation and anti-corrosive purposes where lead and zinc respectively were previously used.

But, the essential points in the discussion of material substitution are as follows:

(a) We cannot expect a neat "phasing" of scarcity, such that, as one resource runs out, another becomes available and so on. There is possibility of complete sets of raw materials, substitutable among themselves will be depleted at about the same time.

(b) The substitution may take place with a time lag sufficient to cause disruption in the productive activities of the economy.

(c) Further, the substitute material may cause more pollution than the materials which were in use. For example, aluminium smelters may involve more pollution than their counterpart for tin.

(d) The substitute materials may well require higher energy inputs, as is the case with low-grade copper exploitation.

2. Product Life Extension:

This is a method by which the durability of the product is extended by deliberate design, so that the need for replacement would be postponed.

It is a common practice that many modern producers design the goods for early disposal by the consumers to serve twin purpose of:

(a) Boosting the sales and profits of the producing firm by encouraging consumers to go in for replacement of their goods more rapidly,

(b) Reflecting consumer's apparent desire for rapid changes of their goods for the sake of novelty.

By extending the life of the product, the requirement of resource materials can be appreciably brought down. However, the product life extension method has some disadvantages. It requires the customers to hold on the goods for a longer period.

This will be possible only with substantial increase in the quality of the product to extend its durability. Otherwise, the product may become less suitable and the objective will be defeated. Thus, the product life extension has a potential role to play in conservation of resources.

3. Recycling:

Recycling is a popular and widely practiced method throughout the world by many industrial units. This is a process by which the life of resource is extended by means of recycling it or reusing it as an input or output. This is applicable only to on-energy resources, since the use of a material as an energy resource results in its useless dissipation into the atmosphere.

Industrial wastes and by products can be profitably recycled. But, the profit seeking firm will make an attempt to recycle a product only when the cost of recycling is lower than use of "virgin" resource material. Further, the differential cost between recycling and using virgin resource must remain for a fairly long period.

The recycling decisions depend on so many factors such as:

(i) The value of the resource after recycling,

(ii) Reduction in pollution due to the reduction in residuals disposed of directly to the environment, and

(iii) Reduced demand for land for disposal purposes, releasing it for alternative social uses.

On the cost side, the added pollution that may be generated by the process of recycling, particularly when it involves chemical additives to change the product to an acceptable quality for reuse, has to be considered. Thus, the entire decision making process for recycling is a complex one involving costs, not only to the firm, but also some social costs.

On the technological side also, there are limitations in recycling. The recycled product may be lower in quality and may not be reusable for the same manufacture. Energy expenditure may be high for reclaiming the old product. The recycling process itself may generate pollution. For instance, in paper reuse, bleaches are added to bring back the quality of paper to original level, as seen by the consumer.

This may result in additional pollution due to the bleaching plant. Taking all these into consideration, the scope for recycling may be large in some industries, and in some, it may be much limited. These depend on efficient use of waste and efficient recycling.

Regarding the benefit arising out of the extension in the life of resource, the current benefit may tend to be small unless some other important value is attached.

4. Waste Reduction:

The problem relating to conservation of resources exhibit in two ways, one to consume or exploit the resources in a minimal way and the other is to avoid or reduce wastage in the process of production. If greater attention is paid to the latter, i.e., waste reduction, it will automatically ensure lesser exploitation of resources.

Waste reduction can be achieved by appropriately redesigning industrial processes, so that there will be technological efficiency in utilizing the resource and avoidance of waste to the minimum.

Further, the waste of one industry can be used as the raw material of another industry. In such a case, marketability of industrial wastes should be explored in the place of recycling. Sugar industry can be cited as an excellent example of either using its own wastes or marketing the waste materials.

The bagasse of the sugar mills (which is a by-product) is sold to paper mills where bagasse is the main raw material for manufacture of papers. Similarly, the molasses, a by-product of the sugar mill is used in the distillery of the mill or sold to some other distilleries.

The press-mud, another by-product is sold to fanners to be used as manure for their fields. The marketing of wastes offers solutions to the problem of externality and at the same time gives scope for earning revenue to the industry.

5. Reuse of scrap material

Scraps can be immediately re-incorporated at the beginning of the manufacturing line so that they do not become a waste product. Many industries routinely do this; for example, paper mills return any damaged rolls to the beginning of the production line, and in the manufacture of plastic items, off-cuts and scrap are re-incorporated into new products.

6. Improved quality control and process monitoring

Steps can be taken to ensure that the number of reject batches is kept to a minimum. This is achieved by increasing the frequency of inspection and the number of points of inspection. For example, installing automated continuous monitoring equipment can help to identify production problems at an early stage.

7. Waste exchanges

This is where the waste product of one process becomes the raw material for a second process. Waste exchanges represent another way of reducing waste disposal volumes for waste that cannot be eliminated.

8. Ship to point of use

This involves making deliveries of incoming raw materials or components direct to the point where they are assembled or used in the manufacturing process to minimise handling and the use of protective wrappings or enclosures (example: Fish-booking).

9.Zero waste

This is a whole systems approach that aims to eliminate waste at the source and at all points down the supply chain, with the intention of producing no waste. It is a design philosophy which emphasizes waste prevention as opposed to end of pipe waste management.[4] Since, globally

speaking, waste as such, however minimal, can never be prevented (there will always be an end-of-life even for recycled products and materials), a related goal is pollution prevention.

10. Fitting the intended use

In this strategy, products and packages are optimally designed to meet their intended use. This applies especially to packaging materials, which should only be as durable as necessary to serve their intended purpose. On the other hand, it could be more wasteful if food, which has consumed resources and energy in its production, is damaged and spoiled because of extreme measures to reduce the use of paper, metals, glass and plastics in its packaging.

11. Durability

Improving product durability, such as extending a vacuum cleaner's useful life to 15 years instead of 12, can reduce waste and usually much improves resource optimisation.

But in some cases it has a negative environmental impact. If a product is too durable, its replacement with more efficient technology is likely to be delayed. Therefore, extending an older machine's useful life may place a heavier burden on the environment than scrapping it, recycling its metal and buying a new model. Similarly, older vehicles consume more fuel and produce more emissions than their modern counterparts.

Most proponents of waste minimisation consider that the way forward may be to view any manufactured product at the end of its useful life as a resource for recycling and reuse rather than waste.

Making refillable glass bottles strong enough to withstand several journeys between the consumer and the bottling plant requires making them thicker and so heavier, which increases the resources required to transport them. Since transport has a large environmental impact, careful evaluation is required of the number of return journeys bottles make. If a refillable bottle is thrown away after being refilled only several times, the resources wasted may be greater than if the bottle had been designed for a single journey.

Many choices involve trade-offs of environmental impact, and often there is insufficient information to make informed decisions.

12. Reusable shopping bags

Reusable bags are a visible form of re-use, and some stores offer a "bag credit" for re-usable shopping bags, although at least one chain reversed its policy, claiming "it was just a temporary

bonus". In contrast, one study suggests that a bag tax is a more effective incentive than a similar discount. (Of note, the before/after study compared a circumstance in which some stores offered a discount vs. a circumstance in which all stores applying the tax.) While there is a minor inconvenience involved, this may remedy itself, as reusable bags are generally more convenient for carrying groceries.

13. House hold practices

Appropriate amounts and sizes can be chosen when purchasing goods; buying large containers of paint for a small decorating job or buying larger amounts of food than can be consumed create unnecessary waste. Also, if a pack or can is to be thrown away, any remaining contents must be removed before the container can be recycled.

Home composting, the practice of turning kitchen and garden waste into compost can be considered waste minimisation.

The resources that households use can be reduced considerably by using electricity thoughtfully (e.g. turning off lights and equipment when it is not needed) and by reducing the number of car journeys made. Individuals can reduce the amount of waste they create by buying fewer products and by buying products which last longer. Mending broken or worn items of clothing or equipment also contributes to minimising household waste. Individuals can minimise their water usage, and walk or cycle to their destination rather than using their car to save fuel and cut down emissions.

In a domestic situation, the potential for minimisation is often dictated by lifestyle. Some people may view it as wasteful to purchase new products solely to follow fashion trends when the older products are still usable. Adults working full-time have little free time, and so may have to purchase more convenient foods that require little preparation, or prefer disposable nappies if there is a baby in the family.

The amount of waste an individual produces is a small portion of all waste produced by society, and personal waste reduction can only make a small impact on overall waste volumes. Yet, influence on policy can be exerted in other areas. Increased consumer awareness of the impact and power of certain purchasing decisions allows industry and individuals to change the total resource consumption. Consumers can influence manufacturers and distributors by avoiding buying products that do not have eco-labelling, which is currently not mandatory, or choosing

products that minimise the use of packaging. Where reuse schemes are available, consumers can be proactive and use them.

14. Healthcare facilities practices

Healthcare establishments are massive producers of waste. The major sources of healthcare waste are: hospitals, laboratories and research centres, mortuary and autopsy centres, animal research and testing laboratories, blood banks and collection services, and nursing homes for the elderly.

Waste minimisation can offer many opportunities to these establishments to use fewer resources, be less wasteful and generate less hazardous waste. Good management and control practices among health-care facilities can have a significant effect on the reduction of waste generated each day.

Practices

There are many examples of more efficient practices that can encourage waste minimization in healthcare establishments and research facilities.

Source reduction

- Purchasing reductions which ensures the selection of supplies that are less wasteful or less hazardous.
- The use of physical rather than chemical cleaning methods such as steam disinfection instead of chemical disinfection.
- Preventing the unnecessary wastage of products in nursing and cleaning activities.

Management and control measures at hospital level

- Centralized purchasing of hazardous chemicals.
- Monitoring the flow of chemicals within the health care facility from receipt as a raw material to disposal as a hazardous waste.
- The careful separation of waste matter to help minimize the quantities of hazardous waste and disposal.

Stock management of chemical and pharmaceutical products

- Frequent ordering of relatively small quantities rather than large quantities at one time.
- Using the oldest batch of a product first to avoid expiration dates and unnecessary waste.

- Using all the contents of a container containing hazardous waste.
- Checking the expiry date of all products at the time of delivery.

world.

TOPIC FOUR

EVALUATE CURRENT PRACTICES IN RELATION TO RESOURCE USAGE

Resource Efficiency

Resource efficiency means using resources such as water, energy and even workforce more efficiently.ie - Getting the most out of what you have.

This is beneficial because it reduces the amount of material used and/or manufacturing costs, reduces waste materials and compliance with environmental legislation. It also reduces impact on the environment.

The efficiency with which natural resources are converted into goods and services affects the size of the Ecological Footprint of each and every product we use, consume or make.

This means reducing the total environmental impact of the production and consumption of goods and services, from raw material extraction to final use and disposal.

Document and measure resources

Environmental and resource efficiency issues include:

i. usage of natural resources eg electricity, water and gas
ii. the volume of material usage
iii. waste management system.

Once resource efficiency issues are identified, suggest methods for improving organisation's environmental performance.

Identifying, documenting and measuring resource usage is often called "auditing".

Measuring resource usage

1. Use existing records and documents.

As an example is looking at the electricity usage of business, in which these bills will not only show the cost of electricity, but also the amounts consumed.

2. Actually physically monitor measure and record the usage of the resources.

For instance if wanted to see how much paper the company was using, could actually go out and measure the amount of paper being used by the photocopiers, the printers etc.

Example of usage record

Measuring resource use table below is an example of measuring electricity use in a workplace over a period of a week.

Measuring electricity usage

A kilowatt-hour is the typical way that electricity is measured. A kilowatt (kW) is 1,000 watts and refers to the use of a device that uses 1,000 watts for an hour. To find out the number of hours an appliance or machine must run to make 1kwh, divide 1000 by the wattage of the appliance or machine.

Example 1: 100 watt light bulb

1000/100 = 10. Therefore a 100 watt bulb used for 10 hours equals 1 kwh.

Example 2: 10,000 watt machine

1000/10,000 = .1hr = 6 minutes. Therefore a 10,000 watt machine operated for 6 minutes equals one kwh.

Collect Information on Environmental and Resource Efficiency

The following steps help in collection of information on Environmental and resource efficiency;

1. Rank each of the aspects against a series of established criteria

Determine which are the most important (examples of criteria may include waste materials, toxic waste release etc.)

2. Based on the established criteria select aspects to be prioritised

Rankings are used based on the benefits of making changes, the feasibility of the changes proposed and the like.

3. For each criterion identified as important, objectives are set to be achieved.

This may involve using intuition as to what can achieve and what cannot be achieved.

The selection criteria established will be based on various factors which may include:

Selection Criteria

i. Determining the aspects that will meet with regulations in the environment and regarding legislation as being critical
ii. Whether the improvements will lead to cost savings
iii. Whether the achievement is easy, which may allow to show that changes will lead to improvement for skeptical staff
iv. Whether aspects will allow to improve the health and safety of all staff
v. Whether the community around organization has concerns with pollution etc
vi. Whether the chemicals and other supplies in organization are particularly problematic and need a better solution
vii. Whether there are changes in the way things are done, or whether there are specific changes that need to be made, to meet certification requirements
viii. Whether the resources available can be used in a more effective or efficient way

How to improving resource efficiency

i. conducting a waste assessment
ii. improving purchasing to reduce waste
iii. improving storage and inventory management
iv. conserving energy
v. conserving water
vi. preserving waterways
vii. keeping waste out of drains
viii. reducing waste outputs
ix. reducing risk by improving waste management practices

x. improving recording and reporting within your business

xi. updating systems to improve operations and support staff

xii. Reducing odour and air emissions.

Advantages of improving resource efficiency

i. Increased cost saving
ii. Process efficiency
iii. Improved occupational health and safety management
iv. Enhanced shareholder relations
v. Improved reputation.

Waste Assessment

A waste assessment it is the assessment of waste that is discarded, as well as how it is being disposed. A waste assessment gives a visual analysis of waste composition to give an overarching understanding of problems and also identify potential opportunities for an organisation. A waste assessment may be undertaken to:

i. Determine the quantity and type of waste being generated.
ii. Measure performance against current waste plans and targets.
iii. Identify areas of non-compliance.
iv. Review efficiency of waste and recycling systems.
v. Identify opportunities for cost savings and efficiency gains.
vi. Identify potential areas of exposure and risk.
vii. Measure performance against Best Practice.
viii. Quantify and characterise each waste stream to establish benchmark data.
ix. Establish how and why each waste stream is generated.
x. Determine liabilities associated with waste generation.
xi. Identify options for more efficient and effective waste management (for example identify reduction/diversion opportunities).

The following are the key tasks involved in a waste assessment:

i. Select waste assessment team — this should include at least one company employee.
ii. Determine audit scope — this depends on size of assessment required and parameters set.

iii. Collect available data.
iv. Identify and characterise waste streams.
v. Evaluate data.
vi. Identify and prioritise options.
vii. Prepare a report and plan of action

Stages involved in a waste assessment.

1. **Preliminary assessment** – aims to identify major environmental issues, major opportunities for improvement and major economic issues.

2. **Detailed study and improvement plan** – aims to find the best options for minimisation in the site.

3. **Monitoring and review** – aims to monitor and confirm the indicators and targets previously established.

Waste involves the manufacture and discharge or disposal of things that cannot be sold at a profit. The cost of waste management and disposal is almost always much less than the value entrained in the waste.

Analysis and Recording of Current Purchasing Strategies.

Cleaner production starts with cleaner procurement

By improving purchasing, resource use and waste output will be reduced. Buying recycled materials can reduce the amount of waste sent to landfill.

Improve purchasing strategy leads to:

1. Reduce waste production

i. Match package quantities to batch sizes to avoid over ordering of raw materials.
ii. Investigate whether a different raw material would produce less waste.
iii. Set environmental standards for suppliers, their products and services, and request substantiation of their claims.
iv. Check for damaged or tainted goods when received as these are a source of costly waste.
v. Asking suppliers to accept their empty drums in return for full ones.

2. **Reward waste minimisation**

i. Purchase recycled materials where possible.
ii. Give preference to products that are designed for long life, are reusable or recyclable.
iii. Ask supplier to help reduce chemical usage, and share the savings.
iv. Produce efficiency benchmarks for the use of raw materials with the help suppliers.
v. Avoid buying new products or services, which will increase business risk.

Analyse and document current purchasing strategies

There are actions that can be taken to help organisations create and implement an Environmentally Preferable Plan (EPP).

1. Understand What Environmentally Preferable Purchasing Is

EPP's are products and services that have a lesser or reduced effect on human health and the environment when compared to competing products or services that serve the same purpose.

2. Know What Attributes Are Important To Consider

EPP's may include, but not be limited to, items that:

i. Contain recycled materials that are made from sustainable resources, recycled or remanufactured materials or parts
ii. Minimise waste through minimal packaging that is recyclable or reusable (take-back provisions)
iii. Conserve energy and/or water or other natural resources
iv. Prevent pollution such as emissions, VOCs (Volatile Organic Compounds), etc.
v. Consist of fewer toxic substances or reduce the number of toxic substances disposed of or consumed
vi. Protect open-space
vii. Encourage an environmentally positive practice (water fountains, compost bins, recycling containers, engine block heaters, etc.)

viii. Uses energy alternatives to fossil fuel
ix. Influencing suppliers to take up environmental sustainability approaches
x. Researching and participating in programs such as a supply chain program to purchase sustainable products.
xi. All of these attributes add up to the increased quality of human health, planetary health and economic health.

3. Identify Key Participants in the EPP

Participation from a host of various stakeholders is necessary to maximise the success of any green purchasing program; the reason being that the greater the demand for these goods and services, the greater the incentive for industry to respond and provide them. In addition, the greater the competition among industry players, the more competitive pricing for items becomes for all levels of buyers.

Below are the key participants to consider:

• Individuals and groups both inside and outside the organisation who have a direct or indirect interest in the organisation's conduct, actions, products and services, including:

i. Customers
ii. Employees at all levels of the organisation
iii. Government
iv. Investors
v. Local community
vi. Other organisations
vii. Suppliers
viii. Key personnel within the organisation, and specialists outside the organisation who may have particular technical expertise.

4. Identify and Overcome Challenges

All organisations are different and there is no one path towards sustainability; while one organisation may choose to focus on energy management, another may see an opportunity in setting up an effective recycling program. Nevertheless, regardless of the environmental initiatives they choose to pursue, most organisations face very similar issues:

i. Additional work needed to research products, plan and co-ordinate green purchasing programs and implement sustainability efforts.
ii. Lack of commitment or interest from upper management to provide the directives necessary for a more efficient implementation. Possible resistance from co-workers due to the unavailability or lack of staff education and training.
iii. Lack of expertise in environmental issues and new technologies, particularly those involving technical data reporting and analysis.
iv. Conflicting or confusing information that may create misconceptions about the quality and performance of environmentally preferable products and services, coupled with a shortage of available time to perform necessary research and investigation.
v. The effort required to change the "business as usual" norm and work with existing suppliers (or to find new suppliers) in order to procure environmentally preferable products and services; there may also be existing relationships between purchasers and suppliers that make it difficult to switch to alternative products.
vi. Difficulty in determining the life-cycle cost of products that considers the manufacturing impacts, potential cost savings opportunities in the operational and maintenance life of the product as well as the expense and process necessary to dispose or recycle the product.

5. Measuring and Marketing Success

As part of the largest procurement group in the nation, governments can use the clout of their buying practices to direct industry manufacturers towards making more responsible products that are reasonably priced and do less harm to the environment and public health.

Many forward-thinking businesses have already adopted environmental purchasing policies for traditional reasons such as:

i. Recognising market preferences and stepping up to serve customers asking for EPP's
ii. Understanding that it can distinguish a business and its products from competitors
iii. Recognising the opportunity to increase operating efficiency
iv. Joining an industry or international market trend to capture market share
v. Improving compliance with environmental regulations.

TOPIC FIVE

IDENTIFY ENVIRONMENTAL LEGISLATIONS/ CONVENTIONS FOR ENVIRONMENTAL CONCERNS

Environmental issues and impacts

We can take many steps to reduce negative environmental impacts and develop a more sustainable approach to the way we work & live.

Firstly, it is important to understand the issues in which all people, business, industry and office based workplaces play a role in contributing to in our surrounding environment. The table below offers an outline of the main environmental and social issues, including examples of the role business plays in each.

Issues	Scope of problems	Implications – globally	Implications for the business sector
Climate Change and Greenhouse Gases	Greenhouse gas emissions from the burning of fossil fuels (mostly coal for electricity production and oil for transport) Production, transport, agriculture and animal emissions Ozone depleting substances	Global average temperature rises from 1-6 deg C° More frequent extreme weather events (bush fires, storms, floods, droughts) Rising ocean levels leading to permanent flooding of coastal areas and displacement of coastal communities	Increasing reputation risk for businesses seen to be not addressing climate change and sustainability Rising fuels and energy costs contribute to costs of production Rising insurance premiums for high risk areas (such as the coast) Rising investment risk for energy intensive businesses

Air quality	Particulates released into the air (such as burning fossil fuels like coal and gas through power plants for energy or vehicles for transportation, using nitrogen fertilizers in agriculture, raising livestock, and the production of nylon) Offensive odours dangerous fumes	Climate change (see above), with a range of effects Human health issues, particularly for the elderly, the young and people with breathing conditions Increase in the hole of the ozone layer and dangerous radiation from the sun reaching the earth Quality of life impacts for people living and working in the area of pollutant source	The business sector is a significant contributor to greenhouse emissions through the energy demands of office workplace spaces, such as lights, computers, other appliances and heating and cooling systems Strategies. Indoor air quality can be affected by Volatile Organics Compounds (VOCs) that are released from electronics (such as computers) during their life. Transportation choices (such as cars, public transport and other means) of commuters contribute to air quality.
Water quality & scarcity	Increased scarcity of water as a resource	Pollution, including greenhouse emissions, affects the chemistry of waterways, in particular the oxygen levels upon which life in the water depends. Waste including toxic	Businesses have a consumer role when catering and purchasing office supplies. Diminishing water resources leading to increased costs to users –

		chemicals that end up in landfill can leach into and contaminate groundwater. Contamination of drinking water impacts on human health.	increased costs of production. Greater legislative and community pressures on the need to conserve diminishing water resources. Implications for offices (toilets, showers, kitchens).
Natural resource supply	Natural resource consumption generally, especially of nonrenewable resources Energy consumption Water consumption	Increased costs as resources deplete (eg petrol costs) Increasing competition for resources Increased disparity in standards of living between those with access to resources and those without. (Ultimately) wars are fought over resources Natural systems Strategies collapse if eco-system resources depleted.	Increased costs of production as resource prices rise (eg oil, water) – weighed up against increased competition from cheap labour markets. Increasingly limited availability of key process inputs make product re-design a necessity. Corporate responsibility perceptions - It is popular in some quarters to blame social disparities resulting from unequal distribution of

			resources on the business sector.
Waste management	Landfilling issues Landfill space is increasingly rare in urban areas- the further afield waste is transported , the more it costs Lost opportunities to sell waste as a resource or at a minimum, removed responsibly Embodied resource issues	Landfill space is increasingly rare in urban areas - the further afield waste is transported, the more it costs. There is no real disposal option for certain types of toxic materials other than to contain them. Black markets have developed for the illegal disposal of toxic waste. When we dispose of an item we dispose all the resources that have gone into its production and distribution.	Waste to landfill costs are increasing, particularly for industry as landfill sites become rarer and governments seek to encourage industry to reuse and recycle more widely. Markets opportunities exist to for the trading of waste products to be recycled. Embodied resources in waste materials are effectively a loss of resource for an industry. E-waste is an increasingly important hazardous waste issue for office based workplaces.
Land and wildlife	Deforestation	Decrease in quality of soil, water and habitat.	The office workplace sector uses a large amount of paper, often

	Land clearing Urban sprawl Waste disposal	Decrease in quality of soil, for food production. Reduction in oxygen producing trees with ability to soak up carbon dioxide. Loss of diversity of wildlife - disruption to food chains. Waste management issues (eg toxic waste storage).	made from non-renewable forest resources. The growth of cities (and office buildings) detracts from land availability natural systems. E-waste disposal (computers, etc) to landfill can contaminate lands as toxic materials leech during the breakdown process.
Heritage	Natural heritage issues Historical sites (including in cities) Indigenous sites	Historical and cultural value. Preservation of sections of wilderness for future generations.	These concerns and values need to be taken into account during business growth planning and activities may be restricted or disallowed where such sites are present.

To secure for current and future generations a safe and healthy environment, a sound and prosperous economy should aim at:

1. Ensure that citizens today and tomorrow have the clean air water, and land essential to sustaining human health and the environment.

2. Protect and enhance, the quality of water resources and promote the wise and efficient use of water.
3. Maintain and enhance the health and diversity of the wildlife and planets.
4. Develop an environmentally literate society.

Environmental legislations /conventions and local ordinances

The role of the Department of Environment and Resource Management is to conserve and manage our natural environment for the benefit of all.

Key responsibilities include:

i. Managing our natural environment for today and for future generations
ii. Climate change—meeting the challenge
iii. Environment—conserving our natural and cultural heritage
iv. Land—managing our land wisely
v. Water—securing water for the future.

The Environment Protection Act, 1986

(No. 29 of 1986) An Act to provide for the protection and improvement of environment and for matters connected therewith. Whereas decisions were taken at the United Nations Conference on the Human Environment held at Stokholm in June 1972

Short Title, Extent and Commencement

1. This Act may be called the Environment (Protection) Act, 1986.
2. It extends to the whole of Kenya.
3. It shall come into force on such date as the National Government may, by notification in the Official Gazette, appoint and different dates may be appointed for different provisions of this Act and for different areas.

The Act clearly states and explains each and every term very precisely like environment, environmental pollutants, environmental pollution, handling, hazardous substance, occupier, prescribed.

General Powers of the National Government

Power of National Government to take measures to protect and improve environment.

1. Subject to the provisions of this Act, the National Government shall have the power to take all such measures, as it deems necessary or expedient for the purpose of protecting and improving the quality of the environment.

2. Planning and execution of a nationwide programme for the prevention, control and abatement of environmental pollution;

3. Laying down standards for the quality of environment in its various aspects;

4. Laying down standards for emission or discharge of environmental pollutants from various sources.

5. Restriction of areas in which any industries, operations or processes or class of industries, operations or processes shall not be carried out or shall be carried out subject to certain safeguards;

6. Laying down procedures and safeguards for the handling of hazardous substances;

7. Examination of such manufacturing processes, materials and substances as are likely to cause environmental pollution;

8. Carrying out and sponsoring investigations and research relating to problems of environmental pollution;

9. Inspection of any premises, plant, equipment, machinery, manufacturing or other processes, materials or substances and giving, by order, of such directions touch authorities, officers or persons as if may consider necessary to take steps for the prevention, control and abatement of environmental pollution;

10. Preparation of manuals, codes or guides relating to the prevention, control and abatement of environmental pollution.

Air Pollution Act, 1981

An Act to provide for the prevention, control and abatement of air pollution, for the establishment, with a view to carrying out the aforesaid purposes, of Boards, for conferring on and assigning to such Boards powers and functions relating thereto and for matters' connected therewith. Whereas decisions were taken at the United Nations Conference on the Human Environment hold in Stockholm in June, 1972, in which Kenya participated, 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 and whereas it is considered necessary to implement the decisions aforesaid in so far as they relate to the preservation of the quality of air and control of air pollution.

Short title, extent and commencement

1. This Act may be called the Air (Prevention and Control of Pollution) Act, 1981.

2. It extends to the whole of Kenya.

3. It shall come into force on such date as the National Government may, by notification in the official Gazette, appoint.

The Act clearly states and explain each and every term very precisely air pollutant, air pollution, approved appliances, approved fuel, automobile, central board, chimney, control equipment, emission, industrial plant, member, occupier, prescribed, Government board.

Water Pollution Act, 1974

An Act to provide for the prevention and control of water pollution and the maintaining or restoring of wholesomeness of water, for the establishment, with a view to carrying out the purposes aforesaid, of Boards for the prevention and control of water pollution, for conferring on and assigning to such Board powers and functions relating thereto and for matters connected therewith. Whereas it is expedient to provide for the prevention and control of water pollution and the maintaining or restoring of wholesomeness of water, for the establishment, with a view to carrying out the purposes aforesaid, of Boards for the prevention and control of water pollution and for conferring on and assigning to such Boards powers and functions relating thereto.

Short title, application and commencement

1. This Act may be called the Water (Prevention and Control of Pollution) Act, 1974,

2. It applies in the first instance to the whole of Kenya.

3. It shall come into force, at on the date of such adoption and any reference in this Act to the commencement of this Act shall.

The Act clearly states and explains each and every term very precisely like board, central board, member, outlet, pollution, prescribed, sewage effluent, sewer, Government board, National Government, trade effluent etc.

The Wildlife (Protection) Act, 1972

An Act to provide for the protection of wild animals and birds and for matters connected therewith or ancillary or incidental thereto.

Short title, extent and commencement

1 This Act may be called the Wild Life (Protection) Act, 1972

2 It extends, in the first instance, to the whole of Kenya and it shall also extend to such other government as may adopt this Act by resolution passed in that behalf in pursuance of Cl. (1) of

The Act clearly states and explains each and every term very precisely like animal, animal article, big game, board, captive animal, cattle, chief wild life warden, closed area, collector,

commencement of this act, dealer, director, game reserve, government property, habitat, hunting, land, license, manufacturer, meat, national park, notification, permit person, prescribed, sanctuary, small game, special game, National Government, taxidermy, trophy, uncured trophy, vehicle, vermin, weapon, wild animal, wild life, wild life warden.

Forest Conservation Act

Kenya's Forest Policies

Development of forest is guided by the policies adopted by a nation to manage them. Scientific forestry was adopted in Kenya since over a century back.. After the Independence Kenyan Republic therefore formulated her National Forest Policy in 1963.

The States were vested with the administration of the forests. The Constitution has recognized the importance of protection of forests and their improvement. It is stipulated, that the Government shall endeavored to protect and improve the environment and to safeguard the forests and wildlife of the country.

The period between 1963 and today has witnessed large-scale depletion of forests and attrition of forestlands. Forests lands were cleared and diverted to other uses like agriculture, industries, hydroelectric projects, settlement of displaced persons and foreign refugees, etc.

This also resulted in diminishing wildlife in the country due to loss of their habitat.

Forests play three important roles in national economy of any country, they are:

i. Protective,
ii. productive,
iii. as a source of accessory benefits.

This calls for an effective legislation. The Kenyan Forest Act, is in force today for the same purpose.

Similarly a comprehensive legislation for the protection of wildlife and nature is to be found in the Wildlife (Protection) Act.

Forest Policy

Kenya's Forest Policy laid down 'public benefit' as the sole objective of the administration of public forest. The Policy suggested the maintenance of forests in hilly and mountain area (such as Mau Forest) areas for preservation of climatic and physical conditions and for protection of cultivated plains below from the divesting action of hill torrents. Forests with valuable timbers

were to be managed on commercial lines. The forests of inferior quality were to be managed mainly in the interest of local population.

Guiding Principles for Forest Policy

The main plan of Forest Policy is protection, conservation and development of forests. Its aims are

i. Maintenance of environmental stability through preservation and restoration of ecological balance,
ii. Conservation of natural heritage,
iii. Check on soil erosion and denudation in catchments area of rivers, lakes and reservoir,
iv. Check on extension of desert areas,
v. Substantial increase in forest/tree cover through massive a forestation and social forestry programmes,
vi. Steps to meet requirements of fuel for wood, fodder, minor forest produce and soil timber of rural and tribal populations,
vii. Increase in productivity of forest to meet the national needs;
viii. Encouragement of efficient utilization of forest produce and optimum substitution of wood,
ix. Steps to create massive people's participation with involvement of women to achieve the objectives and minimize pressure on existing forests.

Forest Conservation

The increasing destruction and degradation of forests and tree lands in hill areas, is leading to heavy erosion of topsoil, erratic rainfall and recurring floods. Another area of concern has been degradation of forests due to biotic pressure. Guidelines have been framed for preparation of working plans and felling in forests.

Some of the salient features are

i. working plans should be up-to-date and stress conservation
ii. preliminary working plan should have a multidisciplinary approach,
iii. tribal rights and concessions should be high-lighted along with control mechanisms,
iv. grazing should be studied in detail and specific prescriptions should cover fodder propagation,
v. shifting cultivation and encroachments need to be controlled
vi. clear-felling with artificial regeneration should be avoided as far as possible and clear-felling

vii. blocks should not exceed ten hectare in hills and 25 hectare area in plains,

viii. banning all felling above 1,000 meter altitude for a few years should be considered to allow these areas to recover

Issues involved in enforcement of Environmental, Legislation.

Politics and the environment cannot be separated. The late 1980s and early 1990s witnessed a new international concern about the environment, both in the developed and developing nations of the world. Environmentalism is also seen as a growing factor in international relations. This concern is leading to international cooperation where only tension has existed before. While there exists no world political body that can enforce international environmental protection, the list of multilateral environmental organizations is growing.

There is no international legislature with authority to pass laws; nor are there international agencies with power to regulate resources on a global scale. An international court at the Hague in the Netherlands has no power to enforce its decisions. Nations can simply ignore the court if they wish. This environmental "coming of age" is reflected in the broadening of intellectual perspective. Governments used-to be preoccupied with domestic environmental affairs. Now, they are beginning to broaden their scope to confront problems that cross international borders, such as transboundary air and water pollution, and threats of a planetary nature, such as stratospheric ozone depletion and climatic warming. It is becoming increasingly evident that only decisive mutual action can secure the kind of world we seek.

Factors Affecting International Environmental Laws

i. **Identification and gravity of the problem:** It is easier to find a solution to a problem once it is widely acknowledged as critical.

ii. **Statistics:** Sufficient fieldwork should be done to collect the required data on the extent of the problem to find possible solutions.

iii. **Geo-Location:** To identify the sources and cause of Environmental problems and the areas under its effects.

iv. **Law and order:** Whether countries have laws protecting the environment and administrative proceedings to enforce those laws.

v. **National and international pressures:** Who favors and who opposes action on the issue in each country.

vi. **Infrastructure (Institutions and policies):** Whether there is a mechanism in place for cooperative action among the interested countries.

vii. **International cooperation:** Whether the affected countries have a tradition of cooperation or conflict.

Public Awareness

Environmental Literacy aims at creating understanding among masses of the delicate balance, which exists, between natural environment and its dependents (humans) to optimize the exploitation of resources on economic basis, which would lead to sustainable development.

Environmental awareness increases easily in financially stable and better-educated people through book reading, films, newspaper, magazines and other electronic media.

Nongovernmental organizations (NGOs) can play a better role in spread of information 'up to village levels. Addressing issues of environmental significance to private voluntary organizations, NGOs, farmers, organizations, cooperatives, schools, universities - and private entrepreneurs, can increase public awareness. This would bring more information to bear on the planning process. Among the various sources, which can increase the public awareness the role of mass media, is vibrant. It is so because people love to watch T.V., listen radio, read newspaper and magazines.

Suggestions

i. It is an effective tool for the spread of Environmental Science.
ii. Media people should be trained in addressing environmental issues to the public.
iii. Special employees should be deputed in press, radio and T.V. media.
iv. Environmental folk plays, puppet shows etc. should be organized to make the ignorant and simple people aware of the present day Environmental problem.
v. Drawing, craft and essay writing contests can be used as an effective tool at school level.
vi. Visual, and calligraphic displays should be mounted in trains and buses as these are used by common masses.
vii. Storybooks and cartoon network can help the future generation to mould itself according to environmental needs.

Environmental standard

Environmental standards are administrative regulations or civil law rules implemented for the treatment and maintenance of the environment. Environmental standards are set by a government and can include prohibition of specific activities, mandating the frequency and methods of monitoring, and requiring permits for the use of land or water. Standards differ depending on the type of environmental activity.

Environmental standards produce quantifiable and enforceable laws that promote environmental protection. The basis for the standards is determined by scientific opinions from varying disciplines, the views of the general population, and social context. As a result, the process of determining and implementing the standards is complex and is usually set within legal, administrative or private contexts.

The human environment is distinct from the natural environment. The concept of the human environment considers that humans are permanently interlinked with their surroundings, which are not just the natural elements (air, water, and soil), but also culture, communication, co-operation, and institutions. Environmental standards should preserve nature and the environment, protect against damages, and repair past damage caused by human activity.

Governmental institutions setting environmental standards

Environmental standards are set by many different institutions, and most of the standards continue to be based on the principle of voluntary self-commitment.

United Nations (UN)

The UN, with 193 member states, is the largest intergovernmental organization. The environmental policy of the UN has a huge impact on the setting of international environmental standards. At the Earth summit in 1992, held in Rio, the member states acknowledged their negative impact on the environment for the first time. During this and the following Millennium Declaration, the first development goals for environmental issues were set.

Since then, the risk of the catastrophe caused by extreme weather has been enhanced by the overuse of natural resources and global warming. At the Paris Agreement in 2015, the UN determined 17 Goals for sustainable development. Besides the fight against global poverty, the main focus of the goals is the preservation of our planet. These goals set a baseline for global environmentalism. The environmental areas of water, energy, oceans, ecosystems , sustainable production, consumer behavior and climate protection were covered by the goals. The goals contained explanations on which mediums were required to reach them.

Whether the member states fulfill the settled goals is questionable. Some members perceive inspection or any other control from external parties as an intervention into their inner affairs. For this reason, the implementation and follow-up are only controlled by the Voluntary National

Reviews. The main control is done by statistical values, which are called indicators. These indicators deliver information if the goals are reached.

European Union

Within the Treaty on the Functioning of the European Union, the Union integrates a self-commitment towards the environment. In Title XX, Article 191.1, it is settled: "Union policy on the environment shall contribute to the pursuit of the following objectives: — preserving, protecting and improving the quality of the environment, — protecting human health, — prudent and rational utilization of natural resources, — promoting measures at international level to deal with regional or worldwide environmental; problems, and in particular combating climate change." All environmental actions are based on this article and lead to a suite of environmental laws. European environmental regulation covers air, biotechnological, chemical, climate change, environmental economics, health, industry and technology, land use, nature and biodiversity, noise, protection of the ozone layer, soil, sustainable development, waste, and water.

United States

In the United States, the development of standards is decentralized. These standards were developed by more than a hundred different institutions, many of which are private. The method of handling environmental standards is a partly fragmented plural system, which is mainly affected by the market. Under the Trump Administration, Climate standards have increasingly become a site of conflict in the politics of global warming.

Ambient air quality standards

The National Ambient Air Quality Standards (NAAQS) are set by the Environmental Protection Agency (EPA) to regulate pollutants in the air. The enforcement of these standards is designed to prevent further degradation of air quality.

States may set their own ambient standards, so long as they are lower than the national standard.

Air emission standards

Emission standards are national regulations managed by the EPA that control the amount and concentration of pollutants that can be released into the atmosphere to maintain air quality,

human health, and regulate the release of greenhouse gases such as carbon dioxide (CO_2), oxides of nitrogen and oxides of sulfur.

The technological standards set by the EPA do not necessarily enforce the use of specific technologies, but set minimum performance levels for different industries.[21] The EPA often encourages technological improvement by setting standards that are not achievable with current technologies. These standards are always set based on the industry's top performers to promote the overall improvement of the industry as a whole.[21]

Environmental Practices

The environmental practice means the application of the most appropriate combination of environmental control measures and strategies. In making a selection for individual cases, at least the following graduated range of measures should be considered. Good Environmental Practices are defined as those actions that seek to reduce the negative environmental impact caused by activities and processes through changes and improvements in the organisation and development of actions. The usefulness of the Good Practices is well proven and lies in its low cost and simplicity of implementation, as well as the fast results obtained.

1. the provision of information and education to the public and to users about the environmental consequences of choice of particular activities and choice of products, their use and ultimate disposal;
2. the development and application of codes of good environmental practice which covers all aspect of the activity in the product's life;
3. the mandatory application of labels informing users of environmental risks related to a product, its use and ultimate disposal;
4. saving resources, including energy;
5. making collection and disposal systems available to the public;
6. avoiding the use of hazardous substances or products and the generation of hazardous waste;
7. recycling, recovery and re-use;
8. the application of economic instruments to activities, products or groups of products;
9. establishing a system of licensing, involving a range of restrictions or a ban.

Montreal Protocol

The Montreal Protocol is an international treaty governing the protection of stratospheric ozone, originally signed in 1987 and substantially amended in 1990 and 1992.

The Montreal Protocol on Substances That Deplete the Ozone Layer, as it is called in full, and its amendments are international treaties requiring that countries end production of ozone-depleting substances (such as CFCs and halons). To assist in reaching this goal, several international organisations report on the science of ozone depletion, implement projects to help move away from ozone-depleting substances, and provide a forum for policy discussions. The full text of the Montreal Protocol is available online.

Kyoto Protocol

The Kyoto Protocol is an international agreement on the reduction of greenhouse gas emissions and on mechanisms aimed at cutting the costs of reducing emissions, in order to address possible changes in the climate. In effect, the Kyoto Protocol requires the world's developed countries to cut greenhouse gas emissions by 5% from 1990 levels by 2008-2010.

Objectives Kyoto Protocol

The main goal of the Kyoto Protocol is to control emissions of the main anthropogenic (human-emitted) greenhouse gases (GHGs) in ways that reflect underlying national differences in GHG emissions, wealth, and capacity to make the reductions. The treaty follows the main principles agreed in the original 1992 UN Framework Convention. According to the treaty, in 2012, Annex I Parties who have ratified the treaty must have fulfilled their obligations of greenhouse gas emissions limitations established for the Kyoto Protocol's first commitment period (2008–2012). These emissions limitation commitments are listed in Annex B of the Protocol.

The Kyoto Protocol's first round commitments are the first detailed step taken within the UN Framework Convention on Climate Change. The Protocol establishes a structure of rolling emission reduction commitment periods. It set a timetable starting in 2006 for negotiations to establish emission reduction commitments for a second commitment period. The first period emission reduction commitments expired on 31 December 2012.

The ultimate objective of the UNFCCC is the "stabilization of greenhouse gas concentrations in the atmosphere at a level that would stop dangerous anthropogenic interference with the climate

system."[25] Even if Annex I Parties succeed in meeting their first-round commitments, much greater emission reductions will be required in future to stabilize atmospheric GHG concentrations.

For each of the different anthropogenic GHGs, different levels of emissions reductions would be required to meet the objective of stabilizing atmospheric concentrations (see United Nations Framework Convention on Climate Change#Stabilization of greenhouse gas concentrations).

Some of the principal concepts of the Kyoto Protocol are:

i. Binding commitments for the Annex I Parties. The main feature of the Protocol[29] is that it established legally binding commitments to reduce emissions of greenhouse gases for Annex I Parties. The commitments were based on the Berlin Mandate, which was a part of UNFCCC negotiations leading up to the Protocol.[30][31]:290
ii. Implementation. In order to meet the objectives of the Protocol, Annex I Parties are required to prepare policies and measures for the reduction of greenhouse gases in their respective countries. In addition, they are required to increase the absorption of these gases and utilize all mechanisms available, such as joint implementation, the clean development mechanism and emissions trading, in order to be rewarded with credits that would allow more greenhouse gas emissions at home.
iii. Minimizing Impacts on Developing Countries by establishing an adaptation fund for climate change.
iv. Accounting, Reporting and Review in order to ensure the integrity of the Protocol.
v. Compliance. Establishing a Compliance Committee to enforce compliance with the commitments under the Protocol.

Features of an environmental strategy

i. Serves as a tool, or process, to improve environmental performance and information mainly "design, pollution control and waste minimization, training, reporting to top management, and the setting of goals"
ii. Provides a systematic way of managing an organization's environmental affairs
iii. Is the aspect of the organization's overall management structure that addresses immediate and long-term impacts of its products, services and processes on the environment.

Environmental Strategies assists with planning, controlling and monitoring policies in an organization.

iv. Gives order and consistency for organizations to address environmental concerns through the allocation of resources, assignment of responsibility and ongoing evaluation of practices, procedures and processes

v. Creates environmental buy-in from management and employees and assigns accountability and responsibility.

vi. Sets framework for training to achieve objectives and desired performance.

vii. Helps understand legislative requirements to better determine a product or service's impact, significance, priorities and objectives.

viii. Focuses on continual improvement of the system and a way to implement policies and objectives to meet a desired result. This also helps with reviewing and auditing the Environmental Strategies to find future opportunities.

ix. Encourages contractors and suppliers to establish their own Environmental Strategies.

x. Facilitates e-reporting to federal, state and provincial government environmental agencies through direct upload.

ASSIGNMET

QUESTIONS

1. Explain the term sustainable development.
2. State **FOUR** urban areas water conservation problems and explain how they can be resolved.
3. Discuss the Environment Protection Act.
4. Discuss issues involved in enforcement of environment legislation.

TOPIC SIX

IMPLEMENT SPECIFIC ENVIRONMENTAL PROGRAMS

Community needs and expectations

The backbone of any thriving economy is the participation of the community. Without their involvement, local governments and organizations would be oblivious to their expectations.

"Community development is the process of increasing the strength and effectiveness of communities, improving people's quality of life and enabling people to participate in decision making to achieve greater long-term control over their lives."

When others determine what communities need, this is not community development, and is unlikely to work well.

This can lead to a vicious cycle: the community causes 'trouble' for the project by such means as blocking roads. The company responds with a 'giveaway'. When the good feelings subside, local people again resort to protests, to which the company responds with another grant.

If we all look at this problem with the objective of sustainable development, the accumulated experience of communities, projects, and places suggests that "what the community wants" amounts to sustainable development, with lasting benefits.

The essence of 'what communities want' can be understood as three things:

1. **Active management of the adverse impacts of development.** Development of a major natural resource project unleashes a profound process of change. There are, very often, very powerful social, environmental and economic impacts. The adverse effects can be mitigated, but that requires the government, the company, or another party to devote resources and take an active ongoing role in managing them.

2. **Equitable sharing of the benefits of development.** Development creates opportunities. Some are in a better position to take advantage of those opportunities than others. Unless someone with capacity and resources actively manages the process and ensures maximisation of development opportunities, these opportunities can be lost.

3. **A recognised role in making the decisions that affects them.** Through the project life thousands of decisions will be made. These may profoundly affect peoples' homes, families, livelihoods, and cultures. Affected people or communities want a say in the decision-

Problems that affect the communities

- **Water Quality.** Any development that changes the amount of water available to a community, the timing of when water is available, or that threatens the long-term security of access to water is a great concern. Even where there are no changes in water quantity, real or perceived changes in water quality trouble people greatly.
- **Social Stratification and Conflict.** Some community members may find ways to take advantage of opportunities created by resource development while others do not.

Resource availability

Resource availability includes information about what resources is available for use, when they're available, and the conditions of their availability.

5s of good housekeeping

Sort	Remove all items from the workplace that are not needed for current production.
Set-in-Order	Arrange needed items so that they are easy to find and put away. Items used often are placed closer to the employee.
Shine	Make sure everything is clean, functioning and ready to go.
Standardize	This is the method you use to maintain the first three S steps.
Sustain	Make a habit of properly maintaining correct procedures.

Sort

This is about going through the workspace, reviewing the items and evaluate every single item. Ask the question, is this absolutely essential for getting the job done. Whatever is not deemed essential should be eliminated or moved to a space away from high-access areas

Set in order

This is where you apply the principle of "there is a place for everything." Ensure items are organized by function and by frequency of use. Often there is waste when looking for things when they are not where they should be or even worse when there is no system at all

Shine

This is how it sounds and it is about cleaning the workspace area. Dirty work materials can lead to equipment failure leading to loss of time caused by repairing or resolving. Poor cleanliness can also lead to safety issues and further inefficiencies.

Standardize

This step is likely considered the most important of the S's. This is about work instructions, checklists, standard work, and other documentation. Often visual cues and visual management is utilized to help reduce decision-making time and to help train positive behaviors.

Sustain

This is about ensuring there is a continuation and no loss of the work put forward to ensure sustainability of the strong practices. Often to do this, an audit system is put in place to ensure there is consistency. This is also about ensuring there is a continuous challenge of the practices put in place to never stop improving

Setting of individual roles /responsibilities

When individuals have clear functions and responsibilities, they know what is expected of them and work more efficiently. Knowing their roles will also help them feel encouraged and motivated toward completing their various tasks.

Benefits of functional roles and responsibilities

Along with increasing individuals efficiency, creating functional roles and responsibilities provides a number of other benefits that could help your company as a whole. Understanding these benefits will motivate team leaders to implement them in the future if they haven't already. Here are some of the benefits of establishing functional roles and responsibilities.

1. Increased productivity

When individuals understand what's expected of them, they know what they need to work on. Having a clear definition of their responsibilities will increase your individuals overall productivity.

2. Individuals success

By effectively delegating necessary tasks and having a set schedule. Employees with clear duties and deadlines have all the tools they need to get the job done and achieve optimal success.

3. Increased morale and momentum

When an employee's responsibilities are clearly defined and they are successful in their role, the entire team will benefit from it.

Resolving problems

The following techniques are usually called *problem-solving strategies*

- **Abstraction:** solving the problem in a model of the system before applying it to the real system
- **Analogy:** using a solution that solves an analogous problem
- **Brainstorming:** (especially among groups of people) suggesting a large number of solutions or ideas and combining and developing them until an optimum solution is found
- **Divide and conquer:** breaking down a large, complex problem into smaller, solvable problems
- **Hypothesis testing**: assuming a possible explanation to the problem and trying to prove (or, in some contexts, disprove) the assumption
- **Lateral thinking:** approaching solutions indirectly and creatively
- **Means-ends analysis:** choosing an action at each step to move closer to the goal
- **Method of focal objects:** synthesizing seemingly non-matching characteristics of different objects into something new
- **Proof:** try to prove that the problem cannot be solved. The point where the proof fails will be the starting point for solving it
- **Reduction:** transforming the problem into another problem for which solutions exist
- **Research:** employing existing ideas or adapting existing solutions to similar problems

- **Root cause analysis:** identifying the cause of a problem
- **Trial-and-error:** testing possible solutions until the right one is found

Develop resource Conservation plans

Resource Conservation Management of the human use of natural resources to provide the maximum benefit to current generations while maintaining capacity to meet the needs of future generations. Conservation includes both the protection and rational use of natural resources.

The Nine-Step Conservation Planning Process

The NRCS uses a nine step planning process whenever it begins a project. The purpose of the steps is to develop and implement plans that protect, conserve, and enhance natural resources within a social and economic perspective.

Step 1: Identify

Planners take into account the current issues of the area and as planning continues, other problems and opportunities may be identified.

Step 2: Determine Objectives

A conservationist guides the process so that it includes the needs, values, resources used, and on-site and off-site ecological protection.

Step 3: Inventory Resources

An inventory of local resources is collected. (soil, water, animals, social and economical)

Step 4: Analyze Resource Data

After taking inventory, the resource data is studied to better understand the natural resource conditions.

Step 5: Formulate Alternatives

During this step multiple alternatives are considered to provide the client with the chance to consider several possibilities.

Step 6: Evaluate Alternatives

After planning alternate solutions, their effectiveness is determined in addressing the current problem.

Step 7: Making Decisions

The landowner chooses which project or plan will work best for their situation. The planner prepares the documentation.

Step 8: Implement the Plan

The landowner carries out the conservation treatments that make up the planned conservation system.

Step 9: Evaluate the Plan

Follow up with the client is performed to evaluate operation and maintenance needs

PREPARED BY: FELIX BIKETI

DEPARTMENT OF ENGINEERING TECHNOLOGY