18CE0406T GLOBAL WARMING AND CLIMATE CHANGE

UNIT – 5

[S7 – S9]

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S7: Green building technology, Landscaping restoration and plantation

S8: ***Mitigations and adaptation in India, Prevent and precaution measures (health issues, environmental damages)***

S9: ***Energy policies for a cool future, Energy Audit.***

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S7: Green building technology, Landscaping restoration and plantation

Green building technology

What is green building?

A Green building is nothing more than a building which is built using reusable materials and other materials which make the building efficient and environmentally friendly. And Green building technology typically covers everything from geothermal heating to energy-efficient appliances.

The expression 'green building' refers to both the eco-friendly process of construction and the concrete structure itself, which is realised following the above mentioned sustainable processes.

In this way, with the term green building we can point to the process of construction, but also to the environmentally sustainable building designed to minimise the total environmental impacts on nature.

From the aesthetic point of view, green building follows the philosophy of designing buildings that are in harmony with the surrounding site. Architectural forms must be inspired by nature, with colours that do not seem artificial and using only the materials that nature provides.

Solar, wind, and hydroelectric dams are all examples of green technology because they are safer for the environment and don't produce fossil fuel waste by-products. Besides the environmental benefits of these alternative energy sources, they can also be used to power a home or a utility power plant.

What are the 7 components of green building?

Goals of green building

- Life cycle assessment.
- Siting and structure design efficiency.
- Energy efficiency.
- Water efficiency.
- Materials efficiency.
- Seperior Indoor environmental quality enhancement.
- Operations and maintenance optimization.
- Waste reduction.
- Storm water management

How is green building produced?

The processes involved in green building cover all the fields of the construction industry, from the siting and the initial design of a building, to the renovation of it, always considering the need for sustainability.

In this way, the mail goal of sustainable building is to reduce the impact of building on the environment. More in particular, renewable resources which provides clean energy with zero **CO_2 emissions** (such as solar, geothermal, biomass energy and wind and hydro power) can be employed, thus resulting in a reduction of waste, pollution and contamination.

How can green building improve human health?

Green building takes into consideration also the protection and preservation of human health, through the use of natural materials, improving indoor air quality and the design of healthy indoor environment. Human health can be improved in different ways, for example, as we already said, green buildings can reduce illnesses caused by poor air quality issues. Using nontoxic building materials green building help fight indoor air pollution. Green building can also really improve the quality of life, for example using materials which can reduce noise on the workplace will improve employees' health, as well as preserving their productivity.

What are the other benefits deriving from green building?

Well designed green buildings will not only create healthier environments for people to live and work, but they will also save your money. First of all, as already said, using green materials will cut energy and water costs.

Experts report that businesses that pay the initial 2% increase for green materials as opposed to traditional building materials (on average) will recoup this initial outlay by as much as six to seven times.

Moreover, sustainable building materials save money in maintenance and reparation costs. Sustainable building materials require less energy to be used, and thus, they are low cost.

Try to imagine a building which is totally enlightened or heated by using only natural daylight; that will incredibly help in reducing energy use in buildings and cut the power source costs.

In addition, the federal, the state and the local governments offer rebates, tax credits and other financial incentives for building green (depending upon where you operate your business).

So, even if initial construction costs may be higher, lower operating and energy costs mean that green buildings provide a long-term return on investment.

What are the benefits of green buildings?

- Low Maintenance and Operation Cost. Green buildings incorporate unique construction features that ensure efficient use of **resources** such water and **energy**. ...
- **Energy** Efficiency. ...
- Enhances Indoor Environment Quality. ...

- Water Efficiency. ...
- Better Health. ...
- Material Efficiency. ...
- Better Environment. ...
- Reduces Strain on Local **Resources**.

Green Building Materials used in Construction

Following is the list of Green building materials used in construction :

1. Earthen Materials
2. Wood
3. Bamboo
4. SIPs
5. Insulated Concrete Forms
6. Cordwood
7. Straw Bale
8. Earth Bags
9. Slate/ Stone Roofing
10. Steel
11. Thatch
12. Composites
13. Natural Fiber
14. Polyurethane
15. Fiber Glass
16. Cellulose
17. Cork
18. Polystyrene and isocyanurate
19. Natural Clay
20. Non- VOC paints
21. Natural Fiber Floor
22. Fiber Cement
23. Stone

Top sustainable technologies in green construction

- **Solar power**. In green construction, there is active **solar power** and the other is passive **solar power**. ...
- Biodegradable materials. ...
- Green insulation. ...
- The use of smart appliances. ...
- Cool roofs. ...
- Sustainable resource sourcing. ...
- Low-energy house and Zero-energy building design. ...
- Electrochromic Smart Glass

Landscaping restoration and plantation

Principles of a landscape approach

- Continual Learning and Adaptive Management
- Common Concern Entry-Point
- Multiple Scale
- Multi-Functionality
- Multi-Stakeholder
- Negotiated and Transparent Change Logic
- Clarification of Rights and Responsibilities
- Participatory and User-Friendly Monitoring
- Resilience
- Strengthened Stakeholder Capability

FLR: Forest landscape Restoration

Designing a FLR Project

Identify clear goals & turn them into measurable objectives

	Goal	Objective	Plan
Meaning	Purpose of FLR project	Accomplishment	Activities that result in accomplishment
Measure	Not measurable/tangible	Measurable	Sequenced list of what, where, when, by whom, at what cost
Timeframe	Long-term	Short to mid-term	Short to mid-term
FLR Example	Restore degraded land along river basin	20 m buffer along rivers	Plant 100 ha of native species along rivers in Kigali provice by end of 2016 by local farmers

Technical aspects of FLR implementation

- Implementation specific for landscape units
  - Restoration methods for forest functions (hydrological, protection, biodiversity, carbon, production)
  - Restoration strategies (active/passive)
  - Species choice/planting design
  - Agriculture crops
- Landscape unit plan – overarching FLR plan
- Capacity building

key guiding principles of landscape restoration

Select site
Identify Stakeholders
Analyze - why forest degradation
Discuss Goals
Prepare for planting
Implement - Plant trees
Monitor the areas
Consider the climate change Impacts
Develop Restoration Plan

i. Select a suitable site or landscape, including the analysis and evaluation of current land uses and land tenure/ownership, and1.identify involved stakeholders.
ii. Analyse and evaluate the drivers of deforestation or forest degradation.
iii. Engage stakeholders, discuss long-term goals of forest restoration considering the interests of all stakeholder groups, and draft a3.preliminary restoration/rehabilitation plan.
iv. Collect seeds, produce seedlings in nurseries and prepare for planting.
v. Plant trees.
vi. Assess capacity-building needs and plan for the necessary training
vii. Establish realistic time schedules and plan for financial requirements.
viii. Monitor restored/rehabilitated areas, and conduct maintenance activities as required.
ix. Consider possible climate-change impacts.
x. Develop a restoration management plan, including:
    - preparing a topographic land-use map, including a designation of forest functions, assessment of road accessibility,existence of natural regeneration and needs for planting;
    - agreeing on restoration/rehabilitation objectivess
    - selecting the restoration/rehabilitation method
    - choosing the species to be used, and establishing a nursery and
    - assessing possible positive and negative social and environmental impacts.

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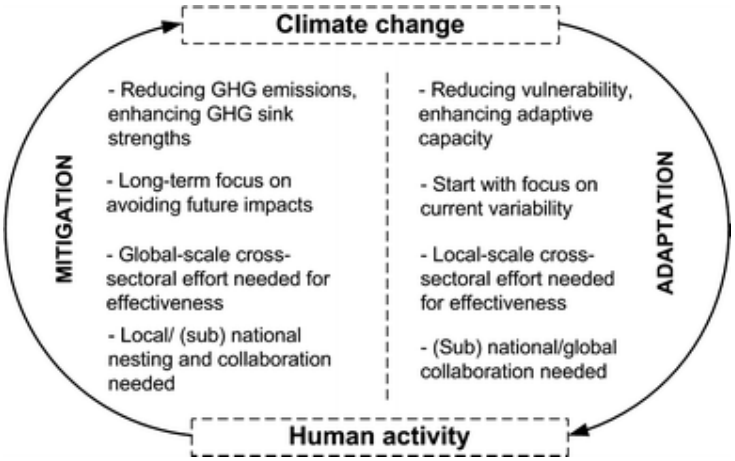
S8: Mitigations and adaptation in India

To promote sustainable, low-carbon, and climate-resilient growth, India will require continuous efforts in mitigation and adaptation through Nationally Appropriate Mitigation Actions and National and State Adaptation Plans.

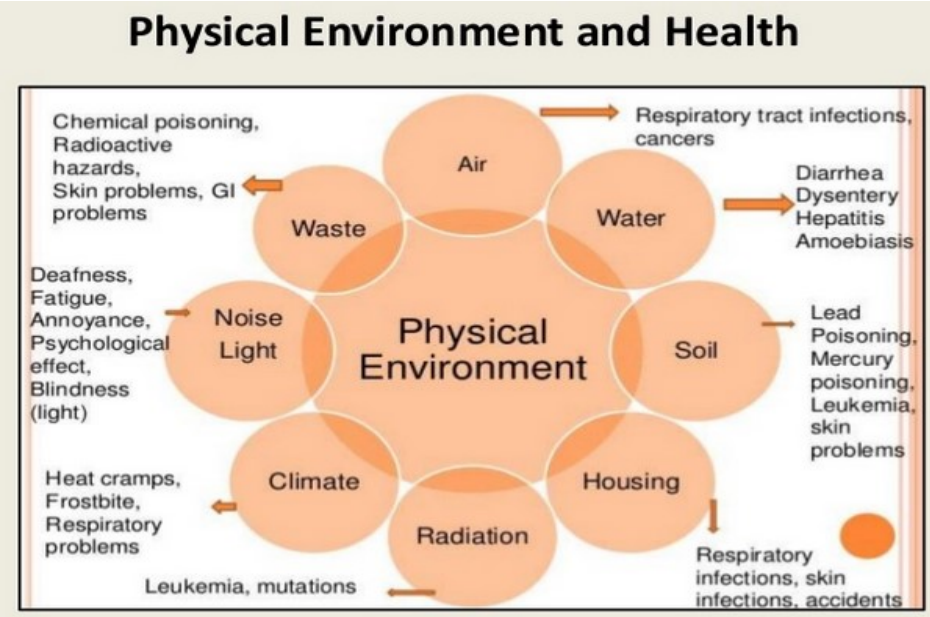
The difference between climate change **mitigation** strategies and climate change **adaptation** is that **mitigation** is aimed at tackling the causes and minimising the possible impacts of climate change, whereas **adaptation** looks at how to reduce the negative effects it has and how to take advantage of any opportunities.



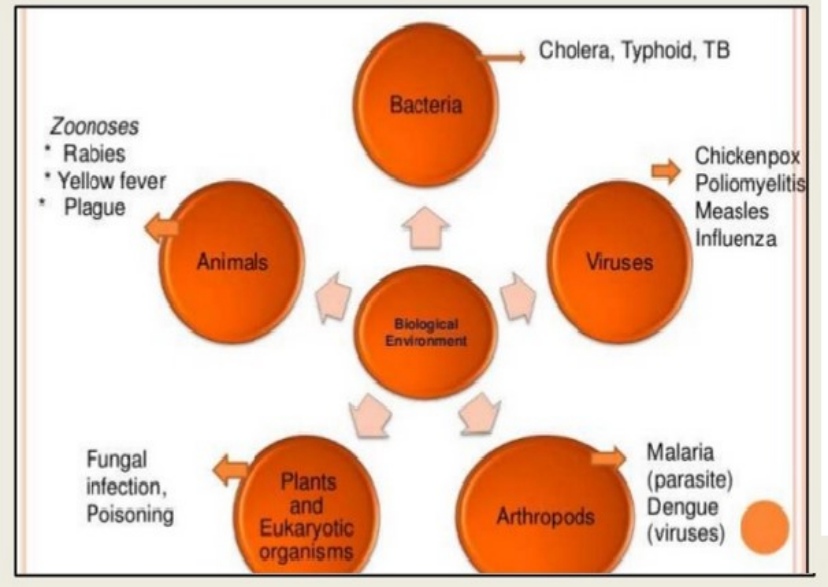
Prevent and precaution measures (health issues, environmental damages)

Environmental Concerns for 2019?

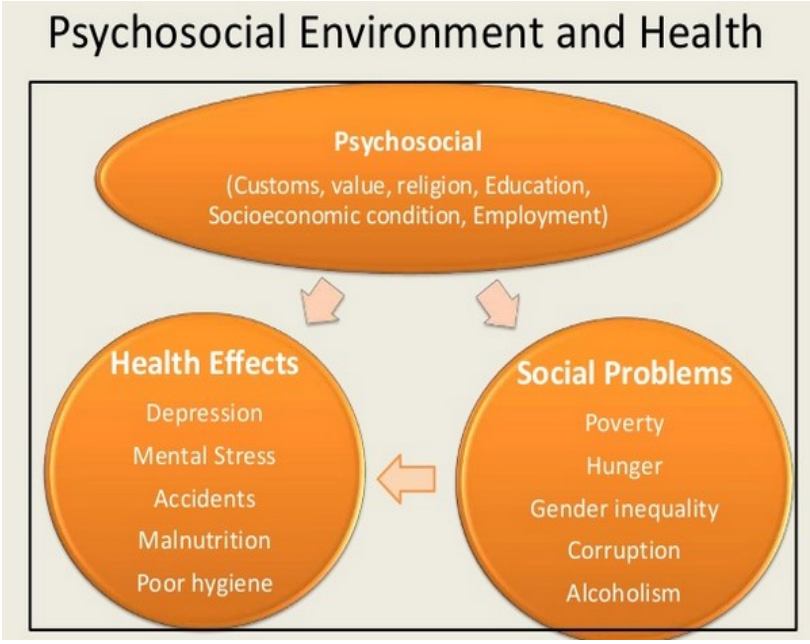
- Biodiversity. Biodiversity is the most complex and vital feature of our planet. ...
- Water pollution is a huge concern for us and our environment. ...
- Air pollution
- Deforestation. We need plants and trees to survive. ...
- Climate Change.



Biological Environment and Health



Psychosocial Environment and Health



Effects on Environment

- Plastic waste disposal on land makes it infertile
- Burning generates toxic emissions -CO, HCl, Dioxin, Furans
- Leaching out of toxic chemicals added as additives
- Littering
- Choked drains can cause flooding
- Affects waste processing facilities like composting
- In environment, plastic breaks down into smaller particles, are ingested by wildlife on land and in the ocean and enter human food chain.

Prevention and control

- Some measures which can be adopted in this direction are as follows:

1. Use of unleaded petrol
2. Using fuels with low sulphur and ash content
3. Promotion of use of public transport
4. Sensitive locations (hospitals, schools, playgrounds etc.) should not be located along the busy streets
5. Vegetation cover should be increased along the roadside, busy traffic intersection points, and on the road dividers.
6. Industries and waste disposal sites should preferably be situated in outskirts of the city.

Prevention & Control

- Encourage plantation of trees
- Less use of air conditioners & refrigerators
- Use solar energy, wind mills for power supply
- Cautious use of vehicles
- Preserve wet lands
- Improve water harvesting
- Ban the plastic bag
- IEC activities

S9: Energy policies for a cool future, Energy Audit.

Energy policies for a cool future

What type of energy will we use in the future?

Atomic energy, **solar energy**, and energy from **wind** and **bio fuels** are just a few of the promising alternatives for a cleaner and greener future. Other relatively new **sources** of energy such as fuel cells, **geothermal energy**, and ocean energy are also being explored.

Energy sector in India: it challenge

- India, one of the fastest under developing country
- Its population is second in world and first in term of density
- In last thirty year, there is boom in power sector with formation of NTPC, NHPC
- 2003 ACT, allowing private player to invest in generating sector change whole picture
- 70% of electricity generation is depend upon coal
- Coal is limited and demand of energy generation rising day by day
- It is need to change the electricity generation pattern.
- Nuclear and Hydro generation may come in picture in future
- Need to invest in renewable form of energy for sustainable growth

Ministry of New and Renewable Energy

- Name it self explain the objective of ministry "to work for exploring and implementation of non conventional and new form of energy"
- MNRE work in five major area:
  1. Grid-interactive renewable power (wind power, Small hydro power, Urban & industrial waste to energy and solar power)
  2. Distributed renewable power (Biomass, Biomass gasifier, waste to energy, Aero generator/ hybrid system)
  3. Rural and Decentralized energy system (family type biogas plant, solar street lamp, home lighting system, Solar Photovoltaic system and wind pump)
  4. Remote village electrification
  5. Other program (energy Park, Akshay urja and hybrid car)

Future Prospective of Renewable Energy in India

- The Integrated Energy Policy Report (IEPR), prepared by the planning commission of India, has recognized renewable energy sources remain important to Indian's energy sector
- With a concerted push and a 40 fold increase in their contribution to the primary energy, renewables may account for only 5-6% of India's energy mix by 2031-32

Resources	Upto 10th plan	11th plan	12th -13th plan	Total
Wind Power	7000 MW	10500 MW	22500 MW	40000 MW
SHP	1960 MW	1400 MW	3140 MW	6500 MW
Bio Power	1037 MW	2100 MW	4363 MW	7500 MW
Solar Power	3 MW	1000 MW	20000 MW	22000 MW
Total				

Energy Audit

An energy audit is an inspection survey and an analysis of energy flows for energy conservation in a building. It may include a process or system to reduce the amount of energy input into the system without negatively affecting the output.

The **main purpose of an energy audit** is to determine whether your home wastes energy, and to pinpoint where energy is being lost so you can evaluate what measures you can take to make your home more energy efficient.

An energy audit is designed to help you identify the most cost effective and practical options to reduce your energy consumption and costs. ... In some cases, identifying billing discrepancies may alone pay for the cost of the audit. An energy audit will look at all common area equipment and central building services.

Energy audits are way for businesses to understand how and where they use energy. An energy audit requires a detailed survey of a business's equipment and an analytical understanding of a business's operating patterns.

Energy audits can be characterised into 4 broad types, they are:

1. Benchmarking
2. Walkthrough Audit
3. Detailed Audit
4. Investment-grade audit

How is an energy audit done?

An **energy audit** is an assessment of your home that takes a look at current **energy** consumption and then identifies **energy** efficiency measures that you can conduct to make your home more efficient. ... Professional **energy audits** can take anywhere from 30 minutes to 4 hours to complete, depending on the size of your home.

Can you do your own energy audit?

To complete your own energy audit, take the following steps.

1. Step 1: Check Heating and Cooling Systems. Heating and air conditioning is the largest **energy** consumer in the United States, accounting for around 48% of the average home's **energy** use. ...
2. Step 2: Inspect Insulation and Sealing. ...
3. Step 3: Account for Electricity Waste.

Energy Audit Instrument

No.	Name of the Instrument	Intended Use
1.	Flue Gas Analysers	Used for optimizing the combustion efficiency by measuring/monitoring the oxygen and CO levels in flue gas of boilers, furnaces etc. and calculation of CO2 percentage in excess air level and efficiency.
2.	Temperature Indicators	Used for measuring temperatures of gases/air, liquids, slurries, semi solids, powders etc. Using different types of probes.
3.	Infrared Thermometers	Used for measuring temperatures from a distance using infrared technology.
4.	Thermal Insulation scanner	Used for measuring loss of energy in Kcal per unit area from hot/cold insulated surfaces. The total loss can be obtained by multiplying the total surface under study.
5.	Steam Trap Monitor	Used for performance evaluation of steam Traps.
6.	Conductivity Meter	Used for on the spot water analysis of the amount of dissolved solids in water.
7.	pH meter	Used for on the spot analysis of effective acidity or alkalinity of a solution/water. Acidity /alkalinity water.
8.	Thermo-hygrometer	Used for measurement of air velocity & humidification, ventilation, Air-conditioning and refrigeration systems etc.
9.	Thermo-hygrometer	Used for measurement of humidity and temperature and the calculation of dew point to find out the heat being carried away by out going gases in industries. Where product drying requires hot air.
10.	Ultrasonic Flow Meter	Used for measurement of flow of liquids through pipelines of various sizes through ultrasonic sensors mounted on the pipelines.
11.	U-Tube Manometer	Used for measurement of differential pressure.
12.	Digital Manometer	Used for measurement of differential pressure.