MODULE 6

ENVIRONMENT AND TECHNOLOGY

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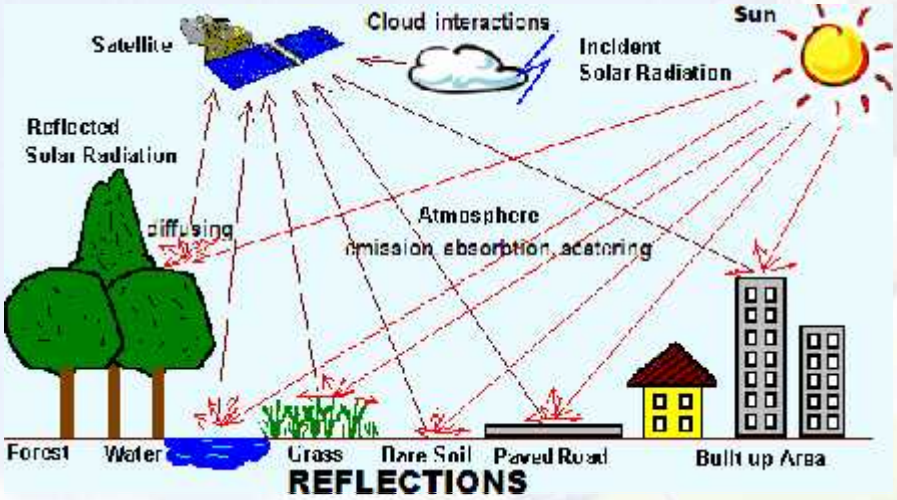
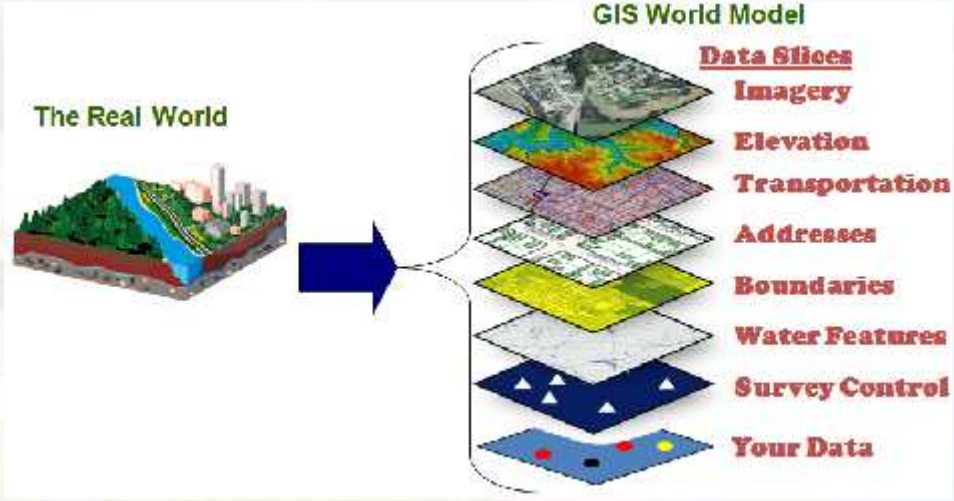
TECHNOLOGIES USED IN ENVIRONMENT



REMOTE SENSING



GEOGRAPHICAL INFORMATION SYSTEM (GIS)

INFORMATION TECHNOLOGY

ROLE OF TECHNOLOGY IN ENVIRONMENT AND HEALTH

Dec '13

- Technology has tremendous potential in the field of environmental education and health.

- Development of technologies like internet facilities, worldwide web, geographical information system (GIS), remote sensing and information through satellites has generated a wealth of up-to-date information on various aspects of environment and health.

- A number of softwares have been developed for environment and health studies, which are user friendly.

- Ministry of Environment and Forest (MoEF) and Government of India (GOI) have created an Environment Information System (ENVIS). Different ENVIS centres are set up in different organizations for information collection and storage which work towards boosting the relationship between health and environment.

ROLE OF TECHNOLOGY IN ENVIRONMENT AND HEALTH

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- Computer based modelling and simulation of environmental scenarios have made it possible to predict future environmental conditions precisely.
- Technology enables environmental scientists and researchers around the world to communicate, collaborate and coordinate.
- Technology can be used for audio, visual and data communications for medical consultation, diagnosis, treatment, nursing and medical education.
- Technology is used for testing of DNA, creating DNA database and genetic information about population. Medical records and finger prints which are used by investigating agencies to identify missing persons and criminals.
- Technology helps in spreading awareness about endemic, epidemic and communicable diseases. With the help of Remote Sensing and GIS there is identification of several infested areas which are prone to some diseases like malaria etc. based upon mapping of such areas.

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Concept of Green Buildings

Green building (also known as **green construction** or **sustainable building**) refers to both a structure and the technology used to construct it that are environmentally responsible & resource-efficient throughout a building's life-cycle: from siting to design, construction, operation, maintenance, renovation, and demolition.

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Concept of Green Buildings

Although new technologies are constantly being developed to complement current practices in creating greener structures, the common **objective is that green buildings** are designed to reduce the overall impact of the built environment on human health and the natural environment by:

- ✓ Efficiently using energy, water and other resources
- ✓ Protecting occupant health and improving employee productivity
- ✓ Reducing waste, pollution and environmental degradation

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Concept of Green Buildings

The **Goals of Green Buildings** are as follows:

- ✓ Siting and structure design efficiency
- ✓ Energy efficiency
- ✓ Water efficiency
- ✓ Materials efficiency
- ✓ Indoor environmental quality enhancement
- ✓ Operations and maintenance optimization
- ✓Waste reduction
- ✓ Cost and payoff

Indoor Air Pollution

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Indoor air pollution is a term which refers to the degradation of air quality within and around buildings and structures, especially as it relates to the health and comfort of building occupants.

Indoor air quality can be affected by gases (including carbon monoxide, radon, volatile organic compounds), particulates, microbial contaminants (mold, bacteria), or any mass or energy stressor that can induce adverse health conditions.

Indoor Air Pollution

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Indoor Environmental Quality may be improved by improving the following:

Indoor Air Quality:

- ✓ Reduce volatile organic compounds (VOCs)
- ✓ Reduce microbial contaminants
- ✓ Provide adequate ventilation
- ✓ Control of moisture accumulation (dampness)

Thermal Quality:

- ✓ Personal temperature and airflow control
- ✓ Properly designed building envelope

Lighting Quality:

- ✓ Creating a high performance luminous environment through the careful integration of daylight and electrical light sources

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CARBON CREDIT

A **carbon credit** is a generic term for any tradable certificate or permit representing the right to emit one tonne of carbon dioxide or the mass of another greenhouse gas with a carbon dioxide equivalent (tCO_2e) equivalent to one tonne of carbon dioxide.

Carbon credits and carbon markets are a component of national and international attempts to mitigate the growth in concentrations of greenhouse gases (GHGs).

One carbon credit is equal to one tonne of carbon dioxide, or in some markets, carbon dioxide equivalent gases.

Carbon trading is an application of an emissions trading approach.

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CARBON CREDIT

The goal is to allow market mechanisms to drive industrial and commercial processes in the direction of low emissions or less carbon intensive approaches than those used when there is no cost to emitting carbon dioxide and other GHGs into the atmosphere.

Since GHG mitigation projects generate credits, this approach can be used to finance carbon reduction schemes between trading partners and around the world.

There are also many companies that sell carbon credits to commercial and individual customers who are interested in lowering their carbon footprint on a voluntary basis.

These carbon offsetters purchase the credits from an investment fund or a carbon development company that has aggregated the credits from individual projects

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Carbon Credit

Buyers and sellers can also use an exchange platform to trade, such as the Carbon Trade Exchange, which is like a stock exchange for carbon credits.

The quality of the credits is based in part on the validation process and sophistication of the fund or development company that acted as the sponsor to the carbon project.

This is reflected in their price; voluntary units typically have less value than the units sold through the rigorously validated Clean Development Mechanism.

Disaster Management

Disaster management (or **emergency management**) is the creation of plans through which communities reduce vulnerability to hazards and cope with disasters.

Disaster management does not avert or eliminate the threats, instead it focuses on creating plans to decrease the impact of disasters.

Failure to create a plan could lead to damage to assets, human mortality, and lost revenue.

Events covered by disaster management include acts of terrorism, industrial sabotage, fire, natural disasters (such as earthquakes, tsunamis etc.), industrial accidents etc.

Disaster Management Cycle

Disaster Management for Earthquakes

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An earthquake is a phenomenon that occurs without warning and involves violent shaking of the ground and everything over it. It results from the release of accumulated stress of the moving lithospheric or crustal plates. The earth's crust is divided into seven major plates, that are about 50 miles thick, which move slowly and continuously over the earth's interior and several minor plates. Earthquakes are tectonic in origin; that is the moving plates are responsible for the occurrence of violent shakes. The occurrence of an earthquake in a populated area may cause numerous casualties and injuries as well as extensive damage to property.

Disaster Management for Earthquakes

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Steps of Disaster Management for Earthquakes:

- Building typology report
- Awareness Generation Resources for Earthquake Diasaster Management
- Disaster(Earthquake) Resistant Construction Practice
- Techno Legal Regime for Safe Construction Practice
- Past Programmes/Projects, Resource Materials on Earthquake Risk Management
- PSHA Table at Grid Points
- Post-Earthquake Reconnaissance Report
- Home Owners Earthquake Safety

For more details, check out
http://www.ndma.gov.in/en/media-public-awareness/disaster/natural-disaster/earthquakes.html

Disaster Management for Tsunamis

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A tsunami is a series of waves in a water body caused by the displacement of a large volume of water, generally in an ocean or a large lake.

Earthquakes, volcanic eruptions and other underwater explosions (including detonations of underwater nuclear devices), landslides, glacier calvings, meteorite impacts and other disturbances above or below water all have the potential to generate a tsunami. In being generated by the displacement of water, a tsunami contrasts both with a normal ocean wave generated by wind and with tides, which are generated by the gravitational pull of the Moon and the Sun on bodies of water.

Disaster Management for Tsunamis

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Steps of Disaster Management for Tsunamis:

- Tsunami Risk Assessment and Vulnerability Analysis
- Tsunami Preparedness
- Structural Mitigation Measures
- Regulation and Enforcement of Techno-Legal Regime
- Emergency Response
- Ensuring Implementation

For more details, check out
http://www.ndma.gov.in/images/guidelines/ndmaguidelinesmanagementofsunamis.pdf

Case Study: Earthquake and Tsunami in Japan in 2011

- The 2011 Tōhoku earthquake and tsunami was an 9.0-magnitude earthquake followed by tsunami waves.

- It was measured at 8.4 on the JMA seismic intensity scale.

- The earthquake happened 130 kilometres (81 mi) off Sendai, Miyagi Prefecture, on the east coast of the Tōhoku of Japan, on March 11, 2011 at 05:46:23 UTC.

- It was at a depth of 24.4 km (15.2 miles).

- It was the most powerful earthquake to hit Japan in recorded history.

- It was also the 5th most powerful earthquake on Earth since 1900.

CASE STUDY: EARTHQUAKE AND TSUNAMI IN JAPAN IN 2011

IMPACT:

- 15854 dead
- 3167 missing
- 26992 injured
- Ruined more than 125000 buildings
- Caused long blackouts for more than 4.4 million buildings
- Left 1.5 million buildings out of water for days
- Explosion and demolition of the Fukushima I Nuclear Power Plant
- Generated radioactive contamination

CASE STUDY: EARTHQUAKE AND TSUNAMI IN JAPAN IN 2011

DISASTER MANAGEMENT:

✓ A tsunami warning was issued 3 minutes after the earthquake.

✓Immediately after the event, The Government of Japan (GOJ) held National Committee for Emergency Management, headed by Prime Minister.

✓ The government declared an emergency in effected area and dispatched the Japan Self Defense Forces for rescue operation.

✓ Foreign Ministry, Ministry of Transport and Ministry of Health were involved in this response, also local offices of disaster response in all prefectures begins their operations as their duty was already clear.

CASE STUDY: EARTHQUAKE AND TSUNAMI IN JAPAN IN 2011

DISASTER MANAGEMENT: continued…

✓ The Ministry of Health was in charge of preparing suitable vehicles for supplying water and assigning hospitals for remedy of casualties and people who have been exposed to radiation.

✓ Ministry of Agriculture, Forestry and Fisheries with Ministry of Finance were responsible for providing food, portable toilet, blanket, radio, gasoil, torch, dry ice and other essential things.

✓ By the command of the government, all of the main highways in north of the country were completely occupied for emergency response activities. Besides, the transport systems includes subway, shipping and the Shinkansen bullet train ceased their activity in Sendai and Tokyo instantly after the quake.

CASE STUDY: EARTHQUAKE AND TSUNAMI IN JAPAN IN 2011

DISASTER MANAGEMENT: continued…

✓ Moreover, at the day of event the Government of Japan declared "the state of nuclear emergency" due to the threat posed by reactors in two Fukushima nuclear power plants (I and II) and 140,000 residents within 20 km of the plant evacuated.

✓ Construction of temporary housing in quake-stricken prefectures was begun 8 days after the event and the first set of buildings was expected to be ready within a month .

For more details, please visit: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3469005/


Thank you!