



# ENVIRONMENTAL COMMUNICATION BA(JMC)-306

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## SYLLABUS UNIT 2

### ECOSYSTEM AND MEDIA :

- Ecosystem: Concept, Structure and Functions
- Ecosystem Succession: Types and Stages
- Biodiversity: Definition and Concept
  - a. Threats to Biodiversity (Global, National and Local): Habitat Loss, Poaching of Wildlife, Man-Wildlife Conflicts
  - b. Endangered and Endemic Species of India
- Role of Multi-Media in sensitising masses towards Ecosystem

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## Ecosystem

### DEFINITION:

- *A group of organisms interacting among themselves and with environment is known as ecosystem.* Thus an ecosystem is a community of different species interacting with one another and with their non living environment exchanging energy and matter.
- Ecology is the study of ecosystems. An ecosystem consists of the biological community that occurs in some locale, and the physical and chemical factors that make up its non-living environment. There are many examples of ecosystems - a pond, a desert, a forest, an estuary, an ocean.
- Ecosystem have dynamic interactions between plants, animals and microorganisms and their environment working together as a functional unit.

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 **Structure of an Ecosystem**

- The term structure refers to the various components of an ecosystem.
- An ecosystem has *two major components*:
  1. **Biotic (living) components**
  2. **Abiotic (non living) components**
- The living organisms (or) living members in an ecosystem collectively called biotic components. Ex: Plants, Animals, Microorganisms
- Classification biotic components : The members of biotic components of an ecosystem are grouped in to three based on how they get food.
  1. **Producer (Plants)**
  2. **Consumer (Animals)**
  3. **Decomposers (Micro-organisms)**

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- **Producers (Autotrophs)**  
Producers synthesize their food themselves through photosynthesis. The green pigment called chlorophyll, present in the leaves of plants, converts CO<sub>2</sub> and H<sub>2</sub>O in the presence of sunlight into carbohydrates. This process is called Photosynthesis.  
Ex: All green plants, trees.
- **Consumers (Heterotrophs)** are further classified as-
  1. *Primary consumers* or Herbivores or Plant eaters: Primary consumers are also called herbivores, they directly depend on the plants for their food. So they are called plant eaters. Examples : Insects, rat, goat, deer, cow etc.
  2. *Secondary consumers* or Meat eaters are primary carnivores, they feed on primary consumers. They directly depend on the herbivores for their food.  
Ex: Frog, cat, snakes, small birds, etc.

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3. *Tertiary consumers* (Secondary carnivores) or (Meat-eaters)  
Tertiary consumers are secondary carnivores, they feed on secondary consumers. They depend on the primary carnivores for their food. Ex- lion, tiger, eagle etc.

- Omnivore: Organisms that feed both on plants and animals. Ex: Human, rat, birds.
- Detritivore: They feed on dead organisms, wastes of living beings and partially decomposed matter. Ex: Termites, earthworm, ants etc.

- **Decomposers**: Decomposers attack the dead bodies of producers and consumers, and decompose them into simpler compounds. During the decomposition inorganic nutrients are released. The inorganic nutrients together with other organic substances are then utilized by the producers for the synthesis of their own food. Ex- fungi, bacteria

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□ **Abiotic (non-living) components:** The non-living components (physical and chemical) of ecosystem collectively form a community called abiotic components (or) abiotic community. Ex: Climate, soil, water, air, energy etc.,

- 1) **Physical components:** Include the energy, climate, nutrients and living space that the biological community needs. They are useful for the growth and maintenance of its member. Ex: Air, water, soil, sunlight, etc.,
- 2) **Chemical Components:** They are the sources of essential nutrients.
  - **Organic substances :** Protein, lipids, carbohydrates, etc.,
  - **Inorganic substances:** All micro (Al, Co, Zu, Cu) and macro elements (C,H, O, P, N, P, K) and few other elements.

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**Functions of an Ecosystem**

- The function of an ecosystem is to allow flow of energy and cycling of nutrients.
- Functions of an ecosystem are of three types.
  1. **Primary function:** The primary function of all ecosystem is manufacture of starch (photosynthesis).
  2. **Secondary function:** The secondary function of all ecosystem is distribution energy in the form of food to all consumers.
  3. **Tertiary Function:** All living systems diet at a particular stage. These dead systems are decomposed to initiate third unction of ecosystems namely "cycling".

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The functioning of an ecosystems may be understood by studying the following terms.

- 1) **Energy and material flow:** Energy is the most essential requirement for all living organisms. *Solar energy is the only source to our planet earth.* It is transformed to chemical energy in photosynthesis by the plants (Primary producers). Some amount of chemical energy is used by the plants for their growth and the remaining is transferred to consumers by the process of eating. Thus the energy enters the ecosystems through photosynthesis and passes through the different tropic levels or feeding levels.
  - The flow of energy in an ecosystem follows the laws of thermodynamics.
    - **1 law of thermodynamics** - "*Energy neither can be created nor destroyed, but it can be converted from one from to other*". Energy for an ecosystem comes from the sun. It is absorbed by plants, it is converted into chemical energy. This chemical energy utilized by consumers transform into heat.
    - **2 law of thermodynamics** - "*Whenever energy is transformed, there is a loss of energy through the release of heat*". Energy is transferred between tropic levels in the form of heat as it moves from one tropic level to another tropic level. The loss of energy takes place through respiration, work, running, hunting etc.

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**2) Food Chains-** "Transfer of food energy from the plants through a series of organisms is known as food chain". A food chain always starts with plant life and ends with animal. When the organisms die, they are all decomposed by microorganism (bacteria and fungi) into nutrients that can again be used by the plants.

- At each and every level, nearly 80-90% of the potential energy gets lost as heat.

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**3) Food Webs:** The interlocking pattern of various food chains in an ecosystem is known as food web. In a food web many food chains are interconnected, where different types of organisms are connected at different trophic levels, so that there are a number of opportunities of eating and being eaten at each trophic level.

- Grass may be eaten by insects, rats, deer's, etc., these may be eaten by carnivores (snake, fox, tiger). Thus there is an interlocking of various food chains called food webs.

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- Difference between food chains and food web:** In a linear food chain if one species gets affected (or) becomes extinct, then the species in the subsequent trophic levels are also affected. But, in a food web, if one species gets affected, it doesn't affect other trophic levels so seriously. There are number of options available at each trophic level.
- Significance of food chains and food webs:** Food chains and food webs play a very important role in the ecosystem.
  - Energy flow and nutrient cycling takes place through them.
  - They maintain and regulate the population size of different trophic levels, and thus help in maintaining ecological balance.
  - They have the property of bio-magnification. The non- biodegradable materials keep on passing from one trophic level to another. At each successive trophic level, the concentration keep on increasing. This process is known as bio-magnification

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**Stages of Ecological Succession**

- Ecological Succession is the process by which the mix of species and habitats changes over time in 5 stages. The stages of Ecological Succession are as follows:
  - 1) Nudation:** Nudation is the first stage of succession. It is the formation of a nude or a bare area. It might result from flooding, erosion, landslide, volcanic eruption, or other artificial or natural reasons.
  - 2) Invasion:** Invasion is the arrival of the propagules or the reproductive bodies of different organisms that can settle on the bare area.
  - 3) Competition and Co-action:** Competition and Co-action mean that the population of the invasive species increases in number within a limited space.
  - 4) Reaction:** Since the organisms grow in a place, the environment molds itself under the organism's influence. It means that the area's temperature, land, water, and soil change.
  - 5) Stabilization or Climax:** The Climax or Stabilized stage is the final or terminal stage of ecological succession. The terminal or final communities referred to as the climate community, reach this stage and become more stable and stay there for a longer time. For instance, grasslands, forests, and coral reefs.

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**Biodiversity**

- The term 'Biodiversity' was coined by Walter G. Rosen in 1986. It originates from a Greek word *Bios* meaning life and *Diversitas* meaning variety. Thus, it literally means variety of life on Earth.
- Biodiversity is variety of life forms on earth and the essential interdependence of all living things.** It is usually of three types:
  - 1) Diversity of Species:** The effective number of different species that are represented in a collection of individuals.
  - 2) Diversity of Genes:** The total number of genetic characteristics in the genetic makeup of a species.
  - 3) Diversity of Ecosystem:** The diversity of a place at the levels of an ecosystem.

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**Threats to Biodiversity**

- Biodiversity is threatened by the sum of all human activities. It is useful to group threats into the categories of poaching of wildlife, habitat destruction, man-wildlife conflicts, pollution, and climate change.
- Within each ecosystem, the interconnected nature of species' interactions means even the elimination of a single species, whether an apex predator, a pollinating insect, or a plant can have cascading effects, causing ripple effects which reconfigure the entire ecosystem in ways that are unpredictable and with unexpected consequences.

**Habitat Loss**

- Habitat loss includes habitat destruction and habitat fragmentation. Habitat destruction occurs when the physical environment required by a species is altered so that the species can no longer live there. For example, half of Sumatra's forests, a biodiversity hotspot, is now gone. The neighbouring island of Borneo has lost a similar area of forest, and forest loss continues in protected areas of Borneo. The forests are removed for timber and to plant palm oil plantations. Habitat fragmentation occurs as the living space of a species is divided into discontinuous patches. For example, a mountain highway could divide a forest habitat into separate patches.

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**Overexploitation**

- Overexploitation (overharvesting) involves hunting, fishing, or otherwise collecting organisms at a faster rate than they can be replenished. While overfishing and poaching are common examples of overexploitation, some fungi and slow-growing plant species are also overexploited. For example, stocks of wild ginseng, which is valued for its health benefits, are dwindling.

**Poaching of Wildlife**

- Poaching or illegal hunting/killing of wildlife is a significant threat to many species, particularly those that are endangered and/or have valuable parts such as an elephant ivory or a rhino horn. Poaching can have devastating effects on population of animals and can even lead to extinction of some species.

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**Human-Wildlife Conflicts**

- As human populations grow and expand into natural areas, conflicts with wildlife can occur. This can include crop and livestock damage, attacks on human and loss of natural resources. In some cases, it leads to killing of wild animals which leads to loss of biodiversity.

**Climate Change**

- Climate change is altering what parts of the planet can accommodate each species as where each species lives is determined by climate either directly – through their ability to cope with heat or cold, dry, or wet conditions – or indirectly through change in the availability of food. As certain species depart ecosystems, seeking cooler climates or spreading into newly warmed areas, animals and plants they interact with changes, meaning the climate change fundamentally 'rewires' historical ecosystems.

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**Endangered & Endemic Species in India**

- Endangered species** are those that are in danger of extinction or are already extinct. Animals or plants are considered to be endangered if there are only a few members of their species left in the wild, and if they are not properly protected, they will eventually become extinct.
- Endemism** refers to the fact that a particular plant or animal species can only be found in a specific region of the planet. These as well will vanish from the globe if conservation efforts are not made. Kangaroos, for instance, are a native species that can only be found in Australia; they are not found anywhere else in the globe.
- At the Rio+20 Earth Summit, the Red List of 2018 was made public for the first time. There are 132 endangered plant and animal species found here that are native to India.
- The Asiatic Lion in Gir Forest National Park, the Sangai deer in Keibul Lamjao National Park, the Nilgiri Tahr and Lion-Tailed Macaque in the Western Ghats of India are other instances.

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- According to the IUCN RED List 2021, a total of 199 species in India are considered to be in the severely endangered category. There were a total of twenty species from India that were added to the IUCN Red List of Critically Endangered Species in the year 2021. There were fourteen animal species and six plant species.
- Species in India that are on the verge of extinction;
  - Kolar Leaf-nosed Large bat-like rock rat
  - Namdapha The Squirrel That Can Fly
  - Nicobar Hangul, also known as the Chinese Pangolin and Jenkin's Shrew
  - Andaman White-toothed Shrew
  - Sumatran Rhinoceros
  - Javan Rhinoceros
  - Pygmy Hog
  - Malabar Civet.

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- The following is a list of the species that are unique to India and can only be found here:
  - **The Asiatic Lion and the Gir Forest-** The Asiatic Lion, commonly known as the Indian Lion, is endemic to only the Gir Forest National Park in Gujarat and the areas immediately around it. These animals are considered to be on the verge of extinction. These are two of India's five big cats; the others are the Indian Leopard and the Bengal Tiger. India is home to a total of five large cats.
  - **Kashmir Stag, Kashmir Valley-** The Dachigam National Park in the Kashmir Valley and the Chamba district in Himachal Pradesh are home to the Hangul, another name for the Kashmir Stag. Both of these areas are located in Himachal Pradesh.
  - **The Western Ghats, and the Lion-Tailed Macaque-** Only the Western Ghats of Southern India are known to be home to this one-of-a-kind primate species, making it the world's rarest, most endangered primate.
  - **Purple Frog, Western Ghats-** The only place on Earth where you can find the purple frog, also called the Pignose frog, is in the rainforests of India's western ghats. It burrows underground for most of its existence.
  - **Sangai Deer, Loktak Lake-** In addition to its other name, the Brow Antlered Deer, this species can only be found in Manipur's Keibul Lamjao National Park. This park is a marshy wetland and it is situated in the southern portions of Loktak lake.
  - **Nilgiri Tahr, Nilgiri Hills-** It is an endangered species of wild sheep that can only be found in the unique Nilgiri Hills of the Western Ghats.

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**Role of Media**

- To be an environmental journalist, one must write about nature and understand scientific language and practice, knowledge of historical environmental events, the ability to keep abreast of environmental policy decisions, and the work of environmental organizations. S/he should have a general understanding of current environmental concerns, and the ability to communicate all of that information to the public in such a way that it can be easily understood, despite its complexity.
- With growing environmental pollution and industrialisation, environmental journalism came up to study and analyse all threats to the environment and ecology and convey these fears and their remedies to the people.
- The Bhopal Gas tragedy was the first instance that woke up the media and drove them to environmental journalism.

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➤ In this modern knowledge society, media can play the following roles in spreading environment-related information:

- **Information Disseminator:** Mass media play a significant role in shaping people's perceptions and awareness of environmental issues. People unknowingly imbibe various kinds of behaviours and attitudes from the media.
- **Agents of Change:** The media and interpersonal interactions reinforce the message and bring about persuasion to change our attitudes, beliefs and behaviours. Though these are very difficult to change, mass media plays a significant role in helping to change political preferences and religious attitudes. Once an attitude is formed, the media functions to channel it in a specific direction.
- **Media as Stimulator:** The mass media activates latent attitudes, prompting people to take action. It helps in mobilising the masses for collective action by 105 Media and Environment appealing to people's conscience to participate in various environmental conservation and support activities, e.g. using paper bags or jute bags instead of Polybags, etc.

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- **Facilitator of development:** Media coverage is crucial for any environmental issue to enter into the arena of public discourse and become a part of the political process. Civil Society Interest groups and non-governmental organizations (NGOs) working on environment- related issues can cultivate public opinion on issues of concern with the help of media.
- **Messenger to policymakers:** Along with center-staging the environmental issues into the hub of debates and discussions, media also tries to triangulate the opinions of different stakeholders. It works as a bridge by amplifying the popular opinions of people and communities across geographies and shares them with policymakers and vice-versa. This plays a significant role in encouraging governments to devise environment-friendly policies.

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