Date: 13/04/2023

To whom it may concern

Subject: Completion of ENVS Project by EDCA and PSYA Gr. C students of Semester II in 2022

The undersigned hereby certifies that the students mentioned in the table given below have completed their AECC 2 - ENVS projects for the University of Calcutta B.A/B.Sc. Semester-II Examination, 2022. These students are mentioned in the modified template of Metric 1.3.2 (as DVV compliance) as ENVS-EDCA_PSYA Gr. Cwith pdf link of their projects stated alongside.

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10	013-1211-0156-21	21/BSCH/0110	LISHA RAO	PSYA
11	013-1211-0157-21	21/BSCH/0112	CHANDRAYEE GHOSAL	PSYA
12	013-1211-0160-21	21/BSCH/0119	ANUSHKA DEY	PSYA
13	013-1211-0190-21	21/BSCH/0174	MONOSWITA PALCHOWDHURY	PSYA
14	013-1211-0216-21	21/BSCH/0202	SULAKSHANA DAS	PSYA
15	013-1211-0253-21	21/BSCH/0142	SANI TANAYA TARUN	PSYA
16	013-1212-0192-21	21/BSCH/0176	BRITI ROY	PSYA
17	013-1212-0193-21	21/BSCH/0177	JOYITA DAS	PSYA
18	013-1214-0163-21	21/BSCH/0125	SOUMITA PAUL	PSYA
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Gokhale Memorial Girls' College Kolkata

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College Name – Gokhale Memorial Girl's College

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Subject - ENVS

Subject Code – AECC-2

Semester - 2

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Index:

Topic :

Forest Ecosystem

Acknowledgement:

I would like to express my gratitude to my ENVS professor Miss Namrata Basu , for her able support and guidance in completing my project . I would also like to extend my thanks to our principal ma'am, Dr. Atashi Karpha for providing us the opportunity to work on this important ENVS topic.

Ecosystem :

A system that includes all living organisms (biotic factors) in an area as well as its physical environment (abiotic factors) functioning together as a unit. ecosystem is a system consisting of biotic and abiotic components that function together as a unit. The biotic components include all the living things whereas the abiotic components are the non-living .

Forest Ecosystem :

A Forest Ecosystem refers to the terrestrial system in which living organisms such as trees, insects, animals and human beings interact with each other. It is the smaller classification of the ecosystem as a whole, which is the biggest functional unit comprising of all the geographical features and living organisms on Earth. There are many types of forest ecosystems and the classifications are based on the temperature and rainfall in the area of the particular forest ecosystem under observation.A forest ecosystem is the most robust of all as it does not undergo major changes by the effect of weather, forces of nature or human intervention.

Types of Forest Ecosystem

There are a few types of forest ecosystems listed below:

1. Tropical Evergreen Rainforest: Only a small percentage of tropical forests are rainforests where average rainfall is 80–400 inches in a year. This forest is characterised by deep and dense vegetation consisting of tall trees reaching different levels.

2. Tropical Deciduous Rainforest: The main characteristic of tropical deciduous rainforest are broad-leaved trees along with dense bushes, shrubs, etc. Two main seasons- summer and winter are distinctly visible there.

3. Temperate Evergreen Forest: Temperate evergreen forest is a type of forest that is characterised by a smaller number of trees but an adequate number of ferns and mosses.

4. Temperate Deciduous Forest: Temperate deciduous forest evolves in the moist temperate region with sufficient rainfall. Here also, winter and summer are well defined, and trees shed their leaves during winter.

5. Taiga/Boreal: Situated just south of the Tundra, Taiga is characterised by evergreen conifers. The average temperature is below the freezing point for almost half of the year.

Characteristics of Forest Ecosystem

A forest ecosystem is quite diverse in characteristics. Some of these characteristics may sound very interesting to you. Here are some of the major characteristics of a forest ecosystem –

- ✓ Seasonal variation

The forest ecosystem of a particular region depends on the seasonal variation of the country in which the forest falls. For example- tropical rainforests receive heavy rainfall every year, whereas temperate forests experience four seasonal variations.

- ✓ Deciduous or evergreen in nature

A forest ecosystem may be deciduous or evergreen, or it may be a mix of both. The trees of a deciduous forest shed the leaves during the winter season, whereas evergreen trees always remain green.

- ✓ Canopy layer structure

The canopy layer is one of the most distinguishing characteristics of a forest ecosystem. The dense canopy layers act as a barrier against wind, rain, snow, etc. to protect various species.Some forest ecosystems, such as rainforests, are characterized by distinct layers of the canopy like treetops, upper canopy layer, lower canopy layer .

- ✓ Attract insects & provide habitat

The forest ecosystem is home to a huge variety of insects. These insects found thousands of options as their shelter in the forest ecosystem. Hence, these insects get attracted to the natural habitats provided by the forest ecosystem.

- ✓ Soil fertility

The soil of forest ecosystems varies in terms of fertility. For example- the soil of temperate and tropical deciduous forests is very fertile enriched with nutrients.

Components of Forest Ecosystem :

- ✓ Producers:

Producers can synthesise their own food by the photosynthesis process. All green plants are considered producers of the ecosystem as they convert sunlight into the chemical energy of food.

- ✓ Primary Consumers:

Since the consumers can not prepare their own food, they depend on producers. Herbivorous animals get their food by eating the producers (plants) directly. Examples of primary consumers are grasshoppers, deer, etc.

- ✓ Secondary Consumers:

Secondary consumers draw their food from primary consumers.

✓ Decomposers:

The decomposers of the forest ecosystem break down dead plants and animals, returning the nutrients to the soil so that they can be used by the producers. Apart from bacteria, ants and termites are important decomposers in the Amazon rainforest. Millipedes and earthworms also help to break down dead matter.

✓ Nutrient Cycle:

The nutrient cycle is cyclic. For the proper functioning of ecosystems, nutrients are required. Carbon, hydrogen, oxygen, and nitrogen constitute about 95% of the mass of living organisms. About 15 to 20 other elements are also needed in relatively small amounts. These are recycled repeatedly between the living and non-living components of the ecosystem.

✓ Energy Flow:

In a forest ecosystem, the grass, which draws its nutrition from sun, soil and water, is eaten by the grasshopper, which in turn is eaten by frogs, snakes and vultures in succession (different trophic levels). In this process of eating and being eaten, nutrients are passed from one step to the next in a food chain. The flow of energy that occurs along a food chain is called energy flow. The pyramid of energy represents the total quantity of energy at each trophic level of a food chain. The flow of energy is always unidirectional.

Conclution:

Forests are the natural treasure of mother Earth was given to us. Unfortunately, the forests around the world are getting destroyed mainly due to pollution & deforestation to fulfill our needs. It is high time to recall the importance of forest ecosystems towards the environment. Also remember, how you can help to protect the forest ecosystem to save millions of plant and animal species.

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TOPIC: STUDY OF ECOSYSTEMS -PONDS

INDEX

INTRODUCTION

WHAT ARE ECOSYSTEMS?

The self-sustaining structural and functional interaction between living and non-living components

An ecosystem is a geographic area where plants, animals, and other organisms, as well as weather and landscape, work together to form a bubble of life.

Ecosystems contain biotic or living, parts, as well as abiotic factors, or nonliving parts. Biotic factors include plants, animals, and other organisms. Abiotic factors include rocks, temperature, and humidity.

An ecosystem is a biological community composed of different types of organisms interacting with each other and the surrounding environmental conditions. We see many living microorganisms living around us in various habitats such as land, oceans, forests, ponds, lakes, deserts, etc. All living organisms are adapted to their respective habitat.

Each ecosystem has its own community. An aquarium community, for example, can have small fish and other organisms. A desert community may have cacti, small snakes, and scorpions. A pond community can have frogs, insects, snakes, and plants, and a forest community may have rabbits, foxes and pine trees. The species in a community are divided into populations according to the particular habitats and ecological niches in the ecosystem.

POND ECOSYSTEM

A well-demarcated area formed by rain or overflowing water is called a pond or pool. It serves as a habitat for different aquatic organisms that interact with each other and the surrounding environment and constitutes a pond ecosystem.

A pond ecosystem is a freshwater ecosystem that can either be temporary or permanent and consists of a wide variety of aquatic plants and animals interacting with each other and the surrounding aquatic conditions. The pond ecosystem falls under the category of a lentic ecosystem because the water remains stagnant for a longer period.

Pond Ecosystem works on ponds that are shallow enough for the sunlight to pass through it. A pond is a self-sufficient and an ideal example of the ecosystem. In a pond, the intimate relation between the inhabiting living and non-living components is well understood. The non-living objects are various types of organic and inorganic substances such as water, sun rays, CO_2, oxygen, calcium, phosphorus, humic acid, etc. The living components are producers, primary consumers, secondary consumers, tertiary consumers, and various types of decomposers.

TYPES OF POND ECOSYSTEM

There are the following types of pond ecosystems:

1. **Garden Pond ecosystems:** These are man-made artificial pond ecosystems that comprise ornamental plants and animal species exported from all over the world.

2. **Salt Pond ecosystems:** These ecosystems are naturally formed at the seaside and contain brackish water. These are formed due to waterlogging. These can also be found in rocky areas on the beach called rock pools. Since it contains brackish water, it can accommodate sea plants and animals.

3. **Freshwater Pond ecosystems:** These ecosystems are naturally formed due to rainfall or soil water saturation due to continuous rain. Moreover, they can also be formed due to the flow of river water into a large and deep depression. These ecosystems serve as a home to freshwater fishes, amphibians, crustaceans, and many other kinds of wildlife.

4. **Venereal Pond ecosystems:** These are seasonal ponds that are temporarily formed during the heaviest rainfall due to the accumulation of water in the depressions in the ground. With the change in the season, they often turn into desert land.

5. **Mountain Pond ecosystems:** Naturally formed ponds are found in the mountain regions. These are formed due to the shifting of rocks and snow melting. They accommodate rare or endangered aquatic species.

CHARECTERISTICS OF POND ECOSYSTEM

The following are the main characteristics of the pond ecosystem:

1. The water in the pond ecosystem is stagnant.

2. Either natural or artificial boundaries surround the pond ecosystem.

3. The pond ecosystem exhibits three distinct zones, the littoral zone, limnetic zone, profundal zone, and benthic zone.

4. The biotic components of the pond ecosystem occupy different levels in the pond ecosystem, therefore, avoid the competition for survival. Scavengers and decomposers occupy the bottom level, and fish occupy the middle level. The plants enclose the pond's boundaries and provide shelter to small animals and insects.

5. Pond ecosystems show a wide range of variety in their size.

POLLUTION OF PONDS

The water in a pond must remain clean if it is to provide a healthy environment for the organisms (animals and plants) living in it. The natural waste from the living and dead organisms is 'recycled' by special tiny organisms called bacteria. Plenty of oxygen is needed for the bacteria to 'break down' the waste.

Perhaps the most serious threat to ponds is chemical pollution as a result of modern farming methods. Over the years fields have been sprayed with pesticides to rid the crops of pests. However, rain often washes the excess chemicals off the crops into nearby ponds, streams or rivers, poisoning some of the animals living there. Fortunately, these poisonous chemicals are not used so freely now and, hopefully, this problem will gradually be reduced.

Another, equally serious, problem connected with agriculture is the use of artificial fertilizers. Powdery chemical fertilizers, containing nitrates, are put on the crops to help their growth but they can also be washed off by rain into nearby ponds. They do not poison the wildlife but the rich supply of nitrogen causes the water plants, especially algae, to grow very quickly. The plants use up so much oxygen during the night and during decaying processes that there is none left for the other pond-life.

PRACTICAL TECHNIQUES FOR CONTROLLING POND POLLUTION

The best way of preventing ponds from becoming polluted is to ensure that their catchments do not produce pollutants. Since most ponds have surface catchments that are relatively small, this is often quite feasible.

To minimize pollution impacts, ensure that as much as possible of the land that drains water into the pond (i.e., the land uphill of the pond) has semi-natural vegetation (e.g., extensive grassland, moorland) and is not intensively managed farmland or urbanized.

In ponds where it is not possible to maintain semi-natural vegetation cover over the whole catchment other useful options are:

1) Route any piped inflow from a potentially polluted source away from the pond.

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4)Remove sediments.

5)Controlling filamentous algae is largely a matter of reducing nutrient levels.

6)To control planktonic algal blooms.

7)Preventing acidification by atmospheric deposition.

CONCLUSION

Pond Ecosystem has a great significance.

They provide inhabitation to scarce species and support biodiversity much more than any other freshwater habitat. The ponds provide inhabitation to wetland plants and animals. Pond works with a combination of three food webs at a time. They are not just important for quenching thirst or providing inhabitation but also to add beauty to the mother nature. It touches our heart and we feel calm and close to nature.

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ACKNOWLEDGEMENT

The success and outcome of this project required a lot of guidance and support from many people. I'm extremely privileged to thank my ENVS (AECC2) teacher Miss Namrata Basu for providing me an opportunity to do the project work and giving me all support and guidance. I'm extremely thankful to my friends who helped me a lot with the project by providing me with necessary information.

INDEX

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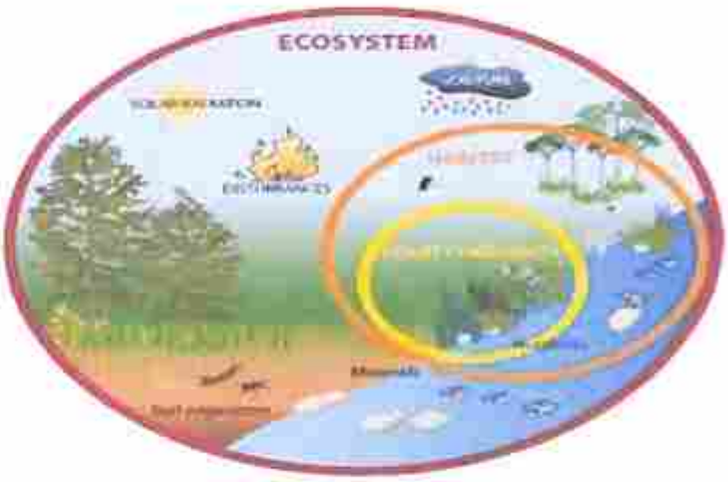

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NB 20/6/2022

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- UNIVERSITY REGD NO:0131211003221
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:ACKNOWLEDGEMENT:

- I would like to express my gratitude towards my Envs teacher for guiding me throughout my project . And also thanks to my friends, parents, for guiding to do the project. I thank all for their positive support and guidance.

:INTRODUCTION:

An ecosystem consists of all the organisms and the physical environment with which they interact .These biotic and abiotic components are linked together through nutrient cycles and energy flows. Energy enters the system through photosynthesis and is incorporated into plant issue .By feeding on plants and on one another animals play an important role in the movement of matter and energy through the system . They also influence the quantity of plant and microbial biomass present. Ecosystems are dynamic entities –they are subject to periodic disturbances and are always in the process of recovering from some past disturbance. The capacity of a system to absorb disturbance and reorganize while undergoing change so as to retain essentially the same function , structure, is termed as ecological resilience .Ecosystem provides a variety of goods and services upon which people depend.

:CHARACTERISTICS OF FOREST ECOSYSTEM:

1. Forests are characterized by warm temperature and adequate rainfall which make the generation of a number of a number of ponds, lakes etc.
2. The forest maintains climate and rainfall.
3. The forest supports many wild animals and protests biodiversity.
4. The soil is rich in organic matter and nutrients , which support the growth of trees.

:FUNCTIONS OF FOREST ECOSYSTEM:

1 : Ecological functions: forests play an important role in maintaining ecological factors such as climate , carbon storage, nutrient cycling and rainfall.

2: Culture and social benefits: the tribal people who live in the forests treat forests as nature goddesses .The traditional beliefs and spirituality saves wild animals from hunters and cutting down of trees by urban people . Few modern people visit forests for recreation.

3: Goods obtained from forests: there are various types of food products such as honey, fruits, obtained from forests. Other than edible parts we obtain wood, biomass etc. the fuel can be extracted from old trees that are buried under the soil.

BIBLIOGRAPHY:

Following information is collected from Wikipedia and all the pictures are collected from:

1. Abode pictures.com

Write in a proper order.

20/6/2022

UNIVERSITY OF CALCUTTA

Environmental Science

PROJECT

STUDY OF COMMON BIRDS OF WEST BENGAL

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STREAM : B.A EDUCATION HONOURS(SEM-2)

NAME OF SUBJECT : ENVIRONMENTAL SCIENCE AECC-2

PAPER CODE : PROJECT

CU ROLL NO : 212013-11-0027

CU REGISTRATION NO : 013-1211-0043-21

CONTENTS

INTRODUCTION

Birds are feathered, winged, two-legged, warm-blooded, egg-laying vertebrates, Modern birds are characterised by feathers, a beak with no teeth, the laying of hard-shelled eggs, a high metabolic rate, a four-chambered heart, and a lightweight but strong skeleton. Birds also have digestive and respiratory system that are uniquely adopted for flight. Some birds, especially corvids and parrots are among the most intelligent animal species culturally transmit knowledge across generations. Many species annually migrate great distances and many more perform shorter irregular movements. Birds are social, communicating with visual signals, call and songs.

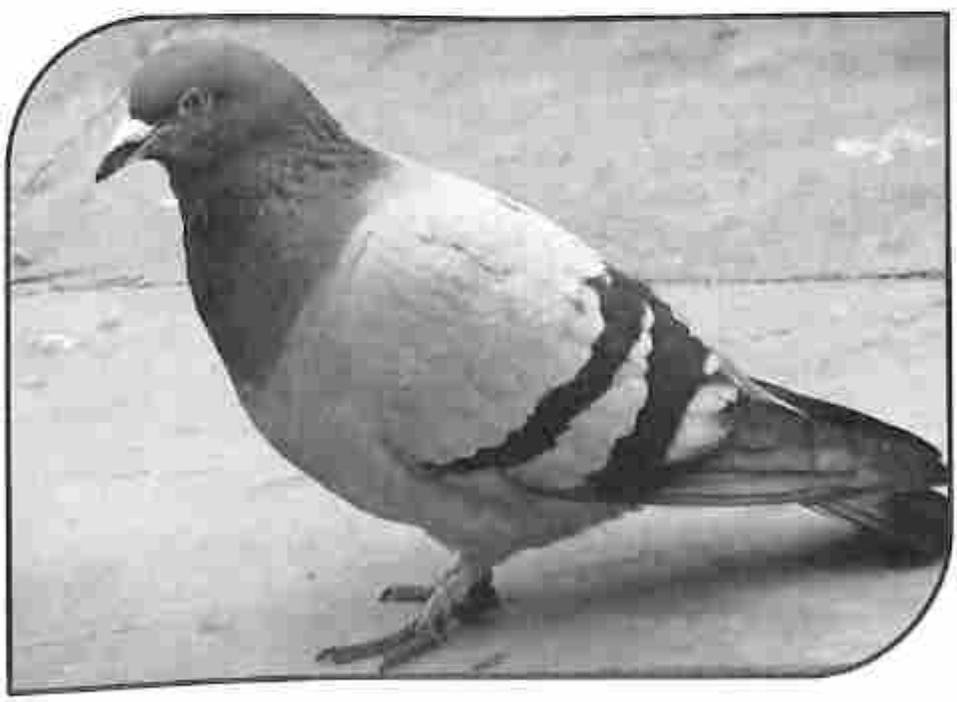
Birds walk, run, hop, swim, perch, cling, fly and even dig. They live in woodlands, open areas, cities, farms lakes, swamps - even the open ocean. They lay their egg and raise their young in holes in the ground, in nests of varying complexity in vegetation or on the ground, in holes in trees, in human-constructed nest boxes and in or on various parts of buildings.

SOME COMMON BIRDS OF WEST BENGAL

1) INDIAN DOMESTIC PIGEON :-

The Domestic Pigeon is a Pigeon si a Pigeon that derived from the rock Pigeon . The Rock Peigeon is the World's Oldest Domesticated Bird.

- Scientific Name :- Columba Liviadomestica
- Distribution :- The Rock Dove has a restricted natural resident range in western and southern Europe, North Africe and Into South Asia.
- Habitat :- Pigeon habitatl is natural cliffs, usually on coasts. Its domesticated form, the feral pigeon, has been widely introduced elsewhere and is common, especially in cites over much of the world.
- Bengali Common Name :- " Payera"



3) RED-VENTED BULBUL :-

The red-vented bulbul is a member of the bulbul family of passerines. It is resident breeder across the Indian subcontinent, including Sri Lanka extending east to Burma and parts of Tibet. It has been introduced in many other parts of the world and has established itself in the wild on several Pacific islands including Fiji, Samoa, Tonga and Hawaii. It has also established itself in parts of the United Arab Emirates, Bahrain, the United States and Argentina

➠ Scientific Name :- Pycnonotus Cafers.

➠ Distribution :- Bulbuls are slim long-tailed passerines with small crests. Red -vented Bulbuls are native from Pakistan to Southwest China. Red -whiskered Bulibuls from Southwest China to northen Malaya. Popular cage birds both species have been introduce to many regions of the world, including Australia, New Zealand island in the Indian and Pacific Occans and the United States.

➠ Habitat :- This is a bird of dry scrub, open forest, plains and cultivated lands.In its native range it is rarely found in mature forests.

4) RED-WHISKERD BULBUL :-

The red-whiskered bulbul, is a passerine bird found in Asia. It is a member of the bulbul family. It is a resident frugivore found mainly in tropical Asia. It has been introduced in many tropical areas of the world where populations have established themselves. It feeds on fruits and small insects. Red-whiskered bulbuls perch conspicuously on trees and have a loud three or four note call. They are very common in hill forests and urban gardens within its range.

- Scientific Name :- Pycnonotus Jocosus.
- Distribution :- Tropical Asia and Australia
- Habitat :- This is a bird of lightly wooded areas, more open country with bushes and shrubs, and farmland.
- Bengali Common Name :- " Siphai Bulbuli"

5) INDIAN CORMORANT :-

The Indian cormorant or Indian shag is a member of the cormorant family. It is found mainly along the inland waters of the Indian Subcontinent but extending west to Sind and east to Thailand and Cambodia. It is a gregarious species that can be easily distinguished from the similar sized little cormorant by its blue eye, small head with a sloping forehead and a long narrow bill ending in a hooked tip.

- Scientific Name :- Phalacrocorax fuscicollis.
- Distribution :- This cormorant fishes gregariously in inland rivers or large wetlands of peninsular India and northern part of Sri Lanka. It also occurs in estuaries and mangroves but not on the open coast.
- Habitat :- This is a Common and widespread bird species which breeds in freshwater wetlands. 3-6 eggs are laid in a nest in a tree.
- Bengali Common Name :- " Pankauri "

6) ASHY DRONGO :-

The ashy drongo is a species of bird in the drongo family Dicruridae. It is found widely distributed across South and Southeast Asia with several populations that vary in the shade of grey, migration patterns and in the size or presence of white patches around the eye.

- Scientific Name :- Dicrurus Leucophaeus.
- Distribution :- The ashy drongo breeds in the hills of tropical southern Asia from eastern Afghanistan east to southern China and Indonesia. Many populations in the northern part of its range are migratory.
- Habitat :- Prefer forest and wooded area and high rising trees hence happiness in garden and groves even in thickly populated. Visit back yard of house where it find flowering and insects like bees etc.
- Bengali Common Name :- " Finge "

7) HOUSE CROW :-

The house crow , also known as the Indian, greynecked, Ceylon or Colombo crow,is a common bird of the crow family that is of Asian origin but now found in many parts of the world.

- Scientific Name :- Corvus Splendens.
- Distribution :- It has a widespread distribution in southern Asia, being native to Nepal, Bangladesh, India, Pakistan, Sri Lanka, Maldives and Laccadive Islands, South West Thailand and coastal southern Iran.
- Habitat :- Indian House crow are strongly commensally, living in close association with people and relying on food scrops and other waste. They prefer highly disturbed habitats within most types of urban and agricultural landscapes and thrive in small villages. Climeatically, house crows are best suited to tropical areas . However, the availability of food scraps is probably a more important influence on abundance and distribution.
- Bengali Common Name :- " Kak "

8) HOUSE SPARROW :-

The house sparrow is a bird of the sparrow family Passeridae, found in most parts of the world. A small bird, it has a typical length of 16 cm (6.3 in) and a mass of 24–39.5 g (0.85–1.39 oz). Females and young birds are coloured pale brown and grey, and males have brighter black, white, and brown markings.

The house sparrow is strongly associated with human habitation, and can live in urban or rural settings. Though found in widely varied habitats and climates, it typically avoids extensive woodlands, grasslands, and deserts away from human development.

- Scientific Name :- Passer Domesticus.
- Distribution :- All over the world Mainly originated in middle east.
- Habitat :-The House sparrow is closely associated with Human Habitation and cultivation.
- Bengali Common Name :- " Chorei "

9) ORIENTAL MAGPIE-ROBIN :-

The oriental magpie-robin is a small passerine bird that was formerly classed as a member of the thrush family Turdidae, but now considered an Old World flycatcher. They are distinctive black and white birds with a long tail that is held upright as they forage on the ground or perch conspicuously.

- Scientific Name :- Copsychus Saularis
- Distribution :- The Magpie Robin is a resident breeder in tropical southern Asia from Bangladesh, interior India, Sri Lanka and eastern pakistan East to Indonesia, Thailand, South China, Malaysia and Singapore .They have been introduced to Australia.
- Habitat :-The oriental magpie-robin is found in open woodland and cultivated areas often to human habitations.
- Bengali Common Name :- " Doyel "

10) COMMON MYNA :-

The common myna or Indian myna , sometimes spelled mynah, is a member of the family Sturnidae native to Asia. An omnivorous open woodland bird with a strong territorial instinct, the myna has adapted extremely well to urban environments.

The Common Myno is brown with a black head. It has a yellow bill, legs and bare eye skin In flight it shows large white wing patches.

- Scientific Name :- Acridotheres Tristis.
- Distribution :- It is a species of bird native to Asia with its initial home range spanning from Iran, Pakistan, India, Nepal, Bhutan, Bangladesh and Sri Lanka; as well as Afghanistan, Uzbekistan, Tajikistan, Turkmenistan, Myanmar etc.
- Habitat :-This abundant passerine is typically found in open woodland, cultivation and around habitation.
- Bengali Common Name :- " Salikh "

11) WHITE-THROATED KINGFISHER :-

The white-throated kingfisher also known as the white-breasted kingfisher is a tree kingfisher, widely distributed in Asia from the Sinai east through the Indian subcontinent to the Philippines.

This kingfisher is a resident over much of its range, although some populations may make short distance movements. It can often be found well away from water where it feeds on a wide range of prey that includes small reptiles, amphibians, crabs, small rodents and even birds. During the breeding season they call loudly in the mornings from prominent perches including the tops of buildings in urban areas or on wires.

- Scientific Name :- Halcyon Smyrnensis.
- Distribution :- This kingfisher is widespread and populations are not threatened. Average density of 4.58 individuals per km2. has been noted in the Sundarbans mangroves.
- Habitat :-White-throated kingfisher is a common species of a variety of habitats, mostly open country in the plains (but has been seen at 7500 ft in the Himalayas[15]) with trees, wires or other perches. The range of the species is expanding.
- Bengali Common Name :- " Machranga "

CONSERVATION OF BIRDS OF INDIA

Scientists and Conservation Professionals have developed a number of techiques to protect birds species. These Techniques have had varying

Caption Breeding
Reintroduction and Transications
Habitat Protection

AND PROJECT LIKE

Project Great Indian Bustard
Protection of Migratory
Save Our Sparrows.

CONCLUSION

Birds qtaching in your backyard. Birds watching also know as birding is one of the fastest growing forms of outdoor recreation in the country. Bird watching is the observation of wild birds rather than caged or domesticated birds. Birding is simply a matter of learing what to look or listen for Bird watcing is a good way for learn the species of birds that live in your specific area and see how they behave. Birds watching is a super reason to visit unique places and thrill to exotic bird species,. You'll find people birding in just about any city, town or country.

ECOLOGICAL IMPORTANCE OF BIRDS

- Birds occupy many levels of trophic webs, from mid-level consumers to top predators.
- As with other native organisms, birds help maintain sustainable population levels of their prey and predator species and, after death, provide food for scavengers and decomposers.
- Many birds are important in plant reproduction through their services as pollinators or seed dispersers.
- Some birds are considered keystone species as their presence in an ecosystem affects other species indirectly.
- Birds also provide critical resources for their many host-specific parasites, including lice that eat only feathers, flies adapted for living on birds, and mites that hitchhike on birds from plant to plant and even between countries.

MODERN THREATS TO BIRDS

Having survived an ice-age, numerous volvanic eruptions and earthquakes, our native species have endured some life-changing circumstance, but nothing has been more disruptive than that arrival of humans. The most devasting threat to the survival of our native species has been the introduction of mammalian pests such as stoats, possums, rats and deer.

Other Human-Induced Threats to our Native Wildlife Have Included :-

- Felling of Native Forests For Timber.
- Damming of Lakes and Rivers For Hydro-electric Development.
- Destruction and Contamination of native Habitats by Mining.
- Clearing of Native Vegetation and Draining of Wetlands for Farmland.
- Over - Fishing and By-Catch of Marine Mammals in our Oceans.
- Ru-off of fertiliser and effluent from agriculture in our waterways

Birds tell us a lot about changes to the environment, they are easy to see, and at BirdLife Australia there are plenty of people looking out for them. By protecting Australia's birds we are looking after the environment as a whole.

There are many different conservation issues which have an impact on Australia's birds. The nature of these issues is often (but not always) a result of changes to their habitat. There are also many other threats, some of which affect whole communities, and others which may be restricted to a specific site, or may only affect individual species.

Bird Conservation

Bird conservation is a field in the science of conservation biology related to threatened birds. Humans have had a profound effect on many bird species. Over one hundred species have gone extinct in historical times, although the most dramatic human-caused extinctions occurred in the Pacific Ocean as humans colonised the islands of Melanesia, Polynesia and Micronesia, during which an estimated 750-1800 species of bird became extinct. According to Worldwatch Institute, many bird populations are currently declining worldwide, with 1,200 species facing extinction in the next century. The biggest cited reason surrounds habitat loss. Other threats include overhunting, accidental mortality due to structural collisions, long-line fishing bycatch, pollution, competition and predation by pet cats, oil spills and pesticide use and climate change. Governments, along with numerous conservation charities, work to protect birds in various ways, including legislation, preserving and restoring bird habitat, and establishing captive populations for reintroductions.

See Late Quaternary prehistoric birds for birds which disappeared in prehistoric and early historic times, usually due to human activity (i.e., starting with the Upper Paleolithic Revolution). For birds having gone extinct in modern times (since 1500), see List of extinct birds.

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Gokhale Memorial Girl's College

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TOPIC :

Forest Ecosystem

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Thank you Every one

ECOSYSTEM –

An ecosystem is the basic unit of the field of the scientific study of nature. According to this discipline, an ecosystem is a physically defined environment.The simplest definition of an ecosystem is that it is a community or group of living organisms that live in and interact with each other in a specific environment.

FOREST ECOSYSTEM-

A Forest Ecosystem refers to the terrestrial system in which living organisms such as trees, insects, animals and human beings interact with each other. It is the smaller classification of the ecosystem as a whole, which is the biggest functional unit comprising of all the geographical features and living organisms on Earth. There are many types of forest ecosystems and the classifications are based on the temperature and rainfall in the area of the particular forest ecosystem under observation.

FUNCTIONS OF FOREST ECOSYSTEM-

1. Goods Obtained from Forests: There are various types of food products such as honey, wild meat, fruits, mushrooms, palm oil and wine, medicinal plants, etc., obtained from forests. Other than edible parts, we can obtain timber, wood biomass, cork, etc., from forests. The fuel can be extracted from old trees that are buried under the soil.

2. Ecological Functions: Forests play an important role in maintaining ecological factors such as climate, carbon storage, nutrient cycling and rainfall.

3. Culture and Social Benefits: The tribal people who live in the forests treat forests as nature goddesses. The traditional beliefs and spirituality saves wild animals from hunters and cutting down of trees by urban people. Few modern people visit forests for recreation.

TYPES OF FOREST ECOSYSTEM-

Tropical Forest Ecosystem

Tropical forests, also known as tropical rainforest, receives almost 100 inches of rain every year. The tropical forest has a wide variety of species among all other types of forest ecosystems.

Tropical forests are usually found in latitude between 23.5 degrees North and 23.5 degrees South. The temperature recorded in tropical forests is between 68 degrees and 77 degrees Fahrenheit.

Evergreen forest

The evergreen forest receives heavy year-round rainfall with no dry season.

Seasonal forest

Seasonal forest host evergreen flora with a short-time dry season.

Dry forest

As the name suggests, dry forests experience a long-period of the dry season.

Montane forest

Montane forests received most of the precipitation in the form of fog, hence also known as cloud forests.

Sub-tropical forest

The sub-tropical forest is found in North & South regions of tropical forests. The flora of this region is adapted to survive in the adverse conditions of summer drought.

Tropical & subtropical coniferous forest

This type of forest experiences dry & hot climatic conditions with conifers that are adapted to resist variable weather.

Temperate Forest Ecosystem

Temperate forests are usually found in North America, Eurasia, Japan, etc. Temperate forest receives less rainfall as compared to tropical forests approximately 30-60 inches every year.

Unlike tropical forests, temperate forests experience all the four seasons with variation in temperature. The winters in the temperate forest quite often experience temperature below freezing point, and in summers, the temperature becomes very high with a high level of humidity.

Temperate Deciduous Forest

Temperate Deciduous forests experience four specific seasons. It receives annual rainfall between 30-60 inches. In winter, the temperate deciduous forest experience snowfall.

The soil of this forest is quite fertile. As a result, you will find a wide variety of vegetation in the temperate deciduous forest, such as ferns, wildflowers, mosses, oak, birch, maple, etc.

Temperate Coniferous Forest

The temperate coniferous forest ecosystem is usually found in coastal areas. Coniferous forests receive heavy rainfall throughout the year, approximately 50-200 inches.

The floor of coniferous forests is mostly covered with a thick layer of decomposed matter. Temperate coniferous forest is covered with evergreen tall conifers.

Boreal Forest Ecosystem

The boreal forest is also known as Taiga forests are generally found in Siberia, Northern Asia, Canada, and Scandinavia. One of the main characteristics of the boreal forest is that it

experiences short summers and very long winter seasons. Boreal forests receive approximately 15-40 inches precipitation every year (mostly receives in the form of snowfall). The trees found in boreal forests are the evergreen type, such as pine, fir, spruce, etc. The boreal forest has a dense canopy that hardly allows the sun to reach the forest surface. This is why the vegetation is quite less in the forest floor.

Savanna Forest Ecosystem

Savanna ecosystem is generally found in South America, Australia, and Africa. Savanna forests are quite vulnerable to forest fires; on the other hand, it has characterized by the ability to re-grow much faster. The landscapes of the Savanna forest ecosystem are covered with large areas of green lands, bushes & clusters of feeble trees.

Characteristics of Forest Ecosystem

A forest ecosystem is quite diverse in characteristics. Some of these characteristics may sound very interesting to you. Here are some of the major characteristics of a forest ecosystem –

Seasonal variation

The forest ecosystem of a particular region depends on the seasonal variation of the country in which the forest falls. For example- tropical rainforests receive heavy rainfall every year, whereas temperate forests experience four seasonal variations.

Deciduous or evergreen in nature

A forest ecosystem may be deciduous or evergreen, or it may be a mix of both. The trees of a deciduous forest shed the leaves during the winter season, whereas evergreen trees always remain green.

Canopy layer structure

The canopy layer is one of the most distinguishing characteristics of a forest ecosystem. The dense canopy layers act as a barrier against wind, rain, snow, etc. to protect various species.Some forest ecosystems, such as rainforests, are characterized by distinct layers of the canopy like treetops, upper canopy layer, lower canopy layer, and forest floor.

CONCLUSION-

The 2005 Global Forest Resource Assessment coordinated by the Food and Agriculture Organization of the United Nations ( ) is the most comprehensive assessment of forests to date, in terms of content and the number of contributors. Information was collected from 229 countries and territories for three points in time: 1990, 2000 and 2005. A series of variables, related to the extent, condition, uses, and values of forests and other wooded land, were analysed. It tells us that forests cover 30% of the land area of planet Earth and range from boreal and temperate forests to arid woodlands and tropical moist forests; from undisturbed primary forests to forests managed and used for a variety of purposes.

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DEPARTMENT : EDUCATION

Pollution from rural areas

What is the issue?

Farming is a major land use throughout Cumbria but management of land for agriculture can result in several types of water pollution. Because this occurs as lots of small inputs over a large area it is called 'diffuse pollution'.

- **Sediment** can naturally enter watercourses but agricultural activities can dramatically increase the amount. This can damage river life and smother fish eggs and spawning grounds as well as causing problems for drinking water and being a vector for other pollutants which bind to the soil particles. The main sources of sediment to streams and rivers are livestock trampling the banks (called poaching), runoff of soils in arable fields and runoff from fields where livestock and machinery have compacted the soil and reduced infiltration.

- **Nitrate and Phosphate** are naturally occurring nutrients that are essential for the growth of animals and plants but human activities can cause very high concentrations. This results in poor water quality and excessive plant growth, which then reduces the oxygen in the water available for river animals and stops us using the water.
  Manure and fertilisers are a major source of nutrient and phosphates. Livestock accessing streams and rivers can input manure directly. Fertiliser and slurry can wash off the land into the watercourse, particularly if they are applied in wet weather.
  Septic tanks can also be sources of phosphate. Septic tanks are found rural areas that are not connected to mains sewerage systems. If thwy are well maintained they can adequately clean household waste before it is discharged into watercourses, but poorly maintained septic tanks could be polluting water courses with sewage, high in phosphates and disease-causing bacteria. To find out more visit the Call of Nature website.

- **Chemicals such as pesticides and sheep dip**, and **foecal bacteria** from livestock, can also enter the watercourses in agricultural areas and are very harmful to aquatic life and to humans.

What locations are affected?

Although the number of pollution incidents from agriculture has declined markedly over the last ten years, pollution from rural areas remains a challenge. Agricultural pollutants are the reasons for 37% of our rivers being classified as 'not in good condition'. This is a particularly widespread issue in the Waver and Wampool and irt catchment areas. Problems with non-mains sewerage systems account for 9 % of the reasons for river not being in good condition with issues in the rural areas of the Ehen, Ellen, Derwent and Cocker catchments.

Why should this concern me?

▶ Cost of having to treat drinking water

- Water companies have to treat high nitrate levels in drinking water to make it safe for people to use. Water treatment cannot remove all pesticides such as metaldehyde, the chemical in slug pellets, to a sufficient degree and it can lead to water treatment works being shut down. This is expensive and costs may be passed on to people and businesses.

▶ Harms ecosystems, sensitive plants and animals, increases toxic algae incidences

- Increased number of toxic algal blooms which are a hazard to people, domestic animals and wildlife and can lead to loss of sensitive plants, animals and their habitat.
- Oxygen levels reduce in water bodies affected by eutrophication, which means fewer aquatic insects and fish.

▶ The quality of our water environments for leisure activities

- Algal growth and poor water quality in our rivers, lakes and estuaries, which affects people's opportunity to use them for leisure activities.
- These losses can mean that the value of tourism and properties decreases.

Algae in Loweswater

What are the future challenges and concerns?

► **Uptake of agri-environment schemes.**

- Farmers can be compensated for managing land in an environmentally sensitive way but changes in these schemes mean future uptake is uncertain.

► **Increased farming intensity**

- There is a possibility that the use of fertilisers and densities of grazing livestock may increase to meet growing demand for food from a larger population.

► **Climate change could increase runoff from agricultural land.**

- Changing rainfall patterns with more storm events could increase the amount of sediment and fertiliser that is washed off the land and into watercourses.

What can be done about this issue?

► **Improving nutrient management, manure and water storage on farms.**

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- Simple measures to separate clean and dirty water such as harvesting rainwater and putting covers on slurry tanks can reduce the amount of slurry that needs to be spread. Spreading fertilisers and slurry in dry weather will reduce runoff into watercourses.
- Ensuring soil is kept in good condition and minimising compaction.
- Having buffer strips of trees or long grass between cultivation and watercourses.
- Fencing off the watercourses to stop livestock trampling the banks.
- These measures can be cost effective and can benefit the farming business.
- Farmers are already doing much to help solve these problems. Many have agri-environment scheme and are paid a contribution for working their land in a way that benefits the environment. There are grants and advice available under Catchment Sensitive Farming (CSF). CSF encourages farmers to take measures to reduce runoff from their land.

Bankside fencing on the River Ellen Restoration project.

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Ecosystem :

A system that includes all living organisms (biotic factors) in an area as well as its physical environment (abiotic factors) functioning together as a unit. ecosystem is a system consisting of biotic and abiotic components that function together as a unit. The biotic components include all the living things whereas the abiotic components are the non-living .

Forest Ecosystem :

A Forest Ecosystem refers to the terrestrial system in which living organisms such as trees, insects, animals and human beings interact with each other. It is the smaller classification of the ecosystem as a whole, which is the biggest functional unit comprising of all the geographical features and living organisms on Earth. There are many types of forest ecosystems and the classifications are based on the temperature and rainfall in the area of the particular forest ecosystem under observation. A forest ecosystem is the most robust of all as it does not undergo major changes by the effect of weather, forces of nature or human intervention.

Types of Forest Ecosystem

There are a few types of forest ecosystems listed below:

1. Tropical Evergreen Rainforest: Only a small percentage of tropical forests are rainforests where average rainfall is 80–400 inches in a year. This forest is characterised by deep and dense vegetation consisting of tall trees reaching different levels.

2. Tropical Deciduous Rainforest: The main characteristic of tropical deciduous rainforest are broad-leaved trees along with dense bushes, shrubs, etc. Two main seasons- summer and winter are distinctly visible there.

3. Temperate Evergreen Forest: Temperate evergreen forest is a type of forest that is characterised by a smaller number of trees but an adequate number of ferns and mosses.

4. Temperate Deciduous Forest: Temperate deciduous forest evolves in the moist temperate region with sufficient rainfall. Here also, winter and summer are well defined, and trees shed their leaves during winter.

5. Taiga/Boreal: Situated just south of the Tundra, Taiga is characterised by evergreen conifers. The average temperature is below the freezing point for almost half of the year.

Characteristics of Forest Ecosystem

A forest ecosystem is quite diverse in characteristics. Some of these characteristics may sound very interesting to you. Here are some of the major characteristics of a forest ecosystem –

- ✓ Seasonal variation

The forest ecosystem of a particular region depends on the seasonal variation of the country in which the forest falls. For example- tropical rainforests receive heavy rainfall every year, whereas temperate forests experience four seasonal variations.

- ✓ Deciduous or evergreen in nature

A forest ecosystem may be deciduous or evergreen, or it may be a mix of both. The trees of a deciduous forest shed the leaves during the winter season, whereas evergreen trees always remain green.

- ✓ Canopy layer structure

The canopy layer is one of the most distinguishing characteristics of a forest ecosystem. The dense canopy layers act as a barrier against wind, rain, snow, etc. to protect various species. Some forest ecosystems, such as rainforests, are characterized by distinct layers of the canopy like treetops, upper canopy layer, lower canopy layer .

- ✓ Attract insects & provide habitat

The forest ecosystem is home to a huge variety of insects. These insects found thousands of options as their shelter in the forest ecosystem. Hence, these insects get attracted to the natural habitats provided by the forest ecosystem.

- ✓ Soil fertility

The soil of forest ecosystems varies in terms of fertility. For example- the soil of temperate and tropical deciduous forests is very fertile enriched with nutrients.

Components of Forest Ecosystem :

- ✓ Producers:

Producers can synthesise their own food by the photosynthesis process. All green plants are considered producers of the ecosystem as they convert sunlight into the chemical energy of food.

- ✓ Primary Consumers:

Since the consumers can not prepare their own food, they depend on producers. Herbivorous animals get their food by eating the producers (plants) directly. Examples of primary consumers are grasshoppers, deer, etc.

- ✓ Secondary Consumers:

Secondary consumers draw their food from primary consumers.

✓ Decomposers:

The decomposers of the forest ecosystem break down dead plants and animals, returning the nutrients to the soil so that they can be used by the producers. Apart from bacteria, ants and termites are important decomposers in the Amazon rainforest. Millipedes and earthworms also help to break down dead matter.

✓ Nutrient Cycle:

The nutrient cycle is cyclic. For the proper functioning of ecosystems, nutrients are required. Carbon, hydrogen, oxygen, and nitrogen constitute about 95% of the mass of living organisms. About 15 to 20 other elements are also needed in relatively small amounts. These are recycled repeatedly between the living and non-living components of the ecosystem.

✓ Energy Flow:

In a forest ecosystem, the grass, which draws its nutrition from sun, soil and water, is eaten by the grasshopper, which in turn is eaten by frogs, snakes and vultures in succession (different trophic levels). In this process of eating and being eaten, nutrients are passed from one step to the next in a food chain. The flow of energy that occurs along a food chain is called energy flow. The pyramid of energy represents the total quantity of energy at each trophic level of a food chain. The flow of energy is always unidirectional.

Conclution:

Forests are the natural treasure of mother Earth was given to us. Unfortunately, the forests around the world are getting destroyed mainly due to pollution & deforestation to fulfill our needs. It is high time to recall the importance of forest ecosystems towards the environment. Also remember, how you can help to protect the forest ecosystem to save millions of plant and animal species.

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GOKHALE MEMORIAL GIRLS COLLEGE
SEMESTER-2
AECC-2

SUBMITTED BY:
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CU ROLL NO.- 212013-11-0078
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TOPIC- FOREST ECOSYSTEM

INDEX

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2. INTRODUCTION

An ecosystem is a structural and functional unit of ecology where the living organisms interact with each other and the surrounding environment. The term ecosystem was first used by Sir Arthur George Tansley, aBritish botanist in1935. Arthur Roy Clapham who first coined the term at the request of Tansley. Ecosystem contains biotic or living parts along with abiotic or nonliving parts. Biotic factors contain plants, animals and other organisms while abiotic factors contain rocks, temperature and humidity.
Ecosystems can be divided into two broad categories which are terrestrial ecosystem and aquatic ecosystem. The terrestrial ecosystem contains cropland, desert, grassland and forest ecosystems; while wetland and river ecosystems are a part of aquatic ecosystem.

3. FOREST ECOSYSTEM

A forest ecosystem is a functional unit or a system which comprises of soil, trees, insects, animals, birds and man as its interacting units. A forest is a large and complex ecosystem and thus having greater species diversity. A forest ecosystem is the most robust of all ecosystems as it does not undergo major changes by the effect of weather, forces of nature or human intervention. This ecosystem consists of different varieties of wild animals, trees, and herb species. Forests are renewable natural resources. A forest is predominately formed by a community of plants like trees, shrubs, herbs, climbers and ground cover. The most significant inter-acting units of the forest ecosystem are soil, animals, insects, micro-organisms and birds.About 18%-20% of the total land area is occupied by forests in India.
Abiotic Components of the forest include inorganic and organic components present in the soil along with temperature, rainfall, light, etc.
Biotic Components are represented by producers, consumers and decomposers.

❖ Forest Ecosystem:

- ❖ A forest is an area with a high density of trees.
- ❖ World's total land area is 13,076 million hectares - (Source: FAO; 1989)
- ❖ Of which total forests account for about 31% of the world's land area.
- ❖ In India, the forest cover is roughly 19% of the total land area.
- ❖ The forest ecosystem are of great concern from the environmental point of view.
- ❖ It provides numerous environmental services like:
  - ➢ Nutrient cycling,
  - ➢ Maintaining biodiversity
  - ➢ Providing wildlife habitat
  - ➢ Affecting rainfall patterns
  - ➢ Regulating stream flow
  - ➢ Storing water
  - ➢ Reducing flooding
  - ➢ Preventing soil erosion
  - ➢ Reclaiming degraded land & many more....

Forest Ecosystem

4. TYPES OF FOREST ECOSYSTEM

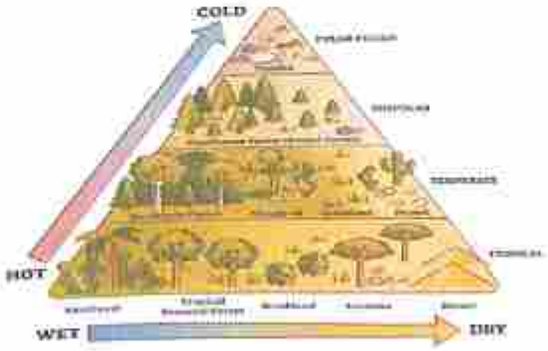
1. Tropical Forest Ecosystem: also known a tropical rainforest, receives about 80-400 inches of rain every year. This forest has an extensive diversity of species among all other types of forest ecosystems. Tropical forests are usually found in latitude between 23.5 degrees North and 23.5 degrees South. The temperature recorded in tropical forests is in between 68 degrees-77degrees Fahrenheit (20degrees-25degrees Celsius). The vegetation mostly includes broad-leafed trees that are very tall about 82-115 feet height. It has dense canopy. It is the home to millions of animals including massive varieties of birds, mammals, amphibians, reptiles etc.
2. Temperate Forest Ecosystem: usually found in North America, Europe, Asia, Japan, etc. Temperate forest receives less rainfall approximately about 30-60 inches every year. The winters are quite often experience temperature below freezing point; while in summers, the temperature becomes very high with a high level of humidity. The soils of temperate forest are rich in organic matter allowing a huge variety of vegetation to grow in the temperate forest and also provides natural habitat to many animals as well as birds. The different types of temperate forests are as follows:

- Temperate Deciduous Forest: experiences all the four specific seasons and receives annual rainfall between 30-60 inches and snowfallduring winters. The soil of this forest is pretty fertile; resulting in a wide variety of vegetation in the temperate deciduous forest such as ferns, wildflowers, mosses, oak, birch, maple, etc; as well as various animal species like the red fox, woodpecker, cardinals, hawks.
- Temperate Coniferous Forest: usually found in coastal areas and receives heavy rainfall throughout the year, roughly 50-200 inches. The floor of coniferous forests is typically covered with a thick layer of decomposed matter. The forest is covered with evergreen tall conifers like cedar, Douglas fir, spruce, maple, cypress, pine, redwood, ferns, mosses, etc. The typical animal species found are include deer, black bear, marbled murrelet, elk, marmot etc.

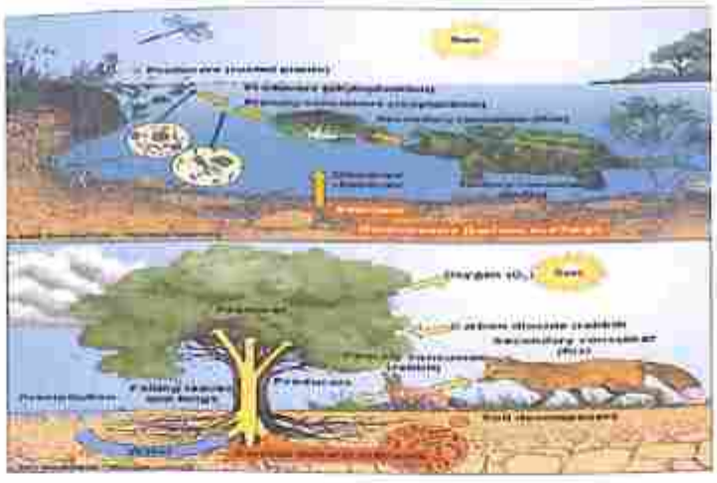
3. Boreal Forest Ecosystem: also known as Taiga forests are usually found in Siberia, Northern Asia, Canada, and Scandinavia. The main characteristics is that it experiences short summers and very long winter seasons; and approximately

receive 15-40 inches precipitation every year. The trees are the evergreen type such as pine, fir, spruce, etc. The dense canopy scarcely allows the sun to reach the forest surface resulting the vegetation to be quite less. The animals found are usually covered with thick fur to protect them from a long period of cold winters; examples– elk, caribou, lynxes, wolverines, deer, snowshoe hare, moose, wolves, etc.

4. Savanna Forest Ecosystem: generally found in South America, Australia, and Africa. These forests are quite vulnerable to forest fires; and also, have been characterized by the ability to re-grow much faster. The landscapes are covered with large areas of green lands, bushes and clusters of feeble trees.



5. COMPONENTS OF FOREST ECOSYSTEM



1. Producers: synthesis their own food by photosynthesis process. Plants are considered as producers as they convert sunlight into chemical energy of food.
2. Primary Consumers: they depend on producers as they cannot produce their own food. Herbivorous animals get their food by eating plants.
3. Secondary Consumers: they draw their food from primary consumers.
4. Decomposers: they break down dead plants and animals returning the nutrients to the soil so that they can be used by the producers.

7. CONCLUSION

Forest is a dense land covered with various plants and trees. Forests ecosystem are divided based on adequate rainfalls and temperature. It is home to many animals and fulfils all the basic needs required such as wood, timber, medicinal plants, etc. Forest helps in maintaining the oxygen and temperature levels of the atmosphere.Forest ecosystem helps in preventing global warming. The water in the soil is absorbed by plants through roots. They release excess into the atmosphere, which helps in the occurrence of rainfall. Forest ecosystems prevent soil erosion and maintain the fertility of the soil.

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NB
20/6/2022

TOPIC: **STUDY OF ECOSYSTEMS**

AECC2 TUTORIAL PROJECT

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Any attempt at any level can't be satisfactorily completed without the support and guidance of my parents and friends. I would like to thank my parents and friends who helped me a lot in gathering different information, collecting data and guiding me from time to time in making this tutorial project, despite of their busy schedules, they gave me different ideas in making this project unique.

THANK YOU,

YOUR'S FAITHFULLY,

LISHA RAO

21/BSCH/0110

PSYA (SEM 2)

INTRODUCTION

An ecosystem is a geographic area where plants, animals, and other organisms, as well as weather and landscape, work together to form a bubble of life. Ecosystems contain biotic or living, parts, as well as abiotic factors, or nonliving parts. Biotic factors include plants, animals, and other organisms. Abiotic factors include rocks, temperature, and humidity. Every factor in an ecosystem depends on every other factor, either directly or indirectly. A change in the temperature of an ecosystem will often affect what plants will grow there, for instance. Animals that depend on plants for food and shelter will have to adapt to the changes, move to another ecosystem, or perish. Ecosystems can be very large or very small. Tide pools, the ponds left by the ocean as the tide goes out, are complete, tiny ecosystems. Tide pools contain seaweed, a kind of algae, which uses photosynthesis to create food. Herbivores such as abalone eat the seaweed. Carnivores such as sea stars eat other animals in the tide pool, such as clams or mussels. Tide pools depend on the changing level of ocean water. Some organisms, such as seaweed, thrive in an aquatic environment, when the tide is in and the pool is full. Other organisms, such as hermit crabs, cannot live underwater and depend on the shallow pools left by low tides. In this way, the biotic parts of the ecosystem depend on abiotic factors.

TYPES OF ECOSYSTEMS

The ecosystems are classified into various categories out of which six types are of the main concern for the study of ecosystems. They are as follows:

(A) POND

A pond ecosystem is a freshwater ecosystem that can either be temporary or permanent and consists of a wide variety of aquatic plants and animals interacting with each other and the surrounding aquatic conditions. The pond ecosystem falls under the category of a lentic ecosystem because the water remains stagnant for a longer period.

Characteristics:

1. The water in the pond ecosystem is stagnant.
2. Either natural or artificial boundaries surround the pond ecosystem.
3. The pond ecosystem exhibits three distinct zones, the littoral zone, limnetic zone, profundal zone, and benthic zone.
4. The biotic components of the pond ecosystem occupy different levels in the pond ecosystem, therefore, avoid the competition for survival. Scavengers and decomposers occupy the bottom level, and fish occupy the middle level.
5. The plants enclose the pond's boundaries and provide shelter to small animals and insects.
6. Pond ecosystems show a wide range of variety in their size.

(B) RIVER

River ecosystems are flowing waters that drain the landscape, and include the biotic (living) interactions amongst plants, animals and micro-organisms, as well as abiotic (nonliving) physical and chemical interactions of its many parts. River ecosystems are part of larger watershed networks or catchments, where smaller headwater streams drain into mid-size streams, which progressively drain into larger river networks. The major zones in river ecosystems are determined by the river bed's gradient or by the velocity of the current. Faster moving turbulent water typically contains greater concentrations of dissolved oxygen, which supports greater biodiversity than the slow-moving water of pools. These distinctions form the basis for the division of rivers into upland and lowland rivers.

River ecosystems have:

1. Flowing water that is mostly unidirectional.
2. A state of continuous physical change.
3. Many different (and changing) microhabitats.
4. Variability in the flow rates of water.
5. Plants and animals that have adapted to live within water flow conditions.

(C) WETLAND

A patch of land that develops pools of water after a rain storm would not necessarily be considered a "wetland", even though the land is wet. Wetlands have unique characteristics: they are generally distinguished from other water bodies or landforms based on their water level and on the types of plants that live within them. Specifically, wetlands are characterized as having a water table that stands at or near the land surface for a long enough period each year to support aquatic plants.

A more concise definition is a community composed of hydric soil and hydrophytes.

Wetlands have also been described as ecotones, providing a transition between dry land and water bodies. Mitsch and Gosselink write that wetlands exist "...at the interface between truly terrestrial ecosystems and aquatic systems, making them inherently different from each other, yet highly dependent on both."

In environmental decision-making, there are subsets of definitions that are agreed upon to make regulatory and policy decisions.

(D) FOREST

A forest ecosystem is a functional unit or a system which comprises of soil, trees, insects, animals, birds, and man as its interacting units. A forest is a large and complex ecosystem and hence has greater species diversity.
Also, it is much more stable and resistant to the detrimental changes as compared to the small ecosystems such as wetlands and grasslands.
A forest ecosystem, similar to any other ecosystem, also comprises of abiotic and biotic components. Abiotic components refer to inorganic materials like air, water, and soil. Biotic components include producers, consumers, and decomposers.
These components interact with each other in an ecosystem and thus, this interaction among them makes it self-sustainable.

The three major forest ecosystems are:

1. The Tropical forest ecosystem
2. The Temperate forest ecosystem
3. The Boreal or Taiga forest ecosystem

(E) ESTUARIES AND AGRO-ECOSYSTEMS

Estuaries: An estuary is a partially enclosed body of water formed where fresh water from land meets and mixes with salt water from the ocean. Estuaries come in all shapes and sizes and can be called bays, lagoons, harbours, inlets, sounds, wetlands and swamps. These are areas where both ocean and land contribute to a unique ecosystem. A basic feature is the instability of an estuary due to the ebb and flood of the tide. Plant and animal wastes are washed away, sediment is shifted and fresh and salt water are mixed. Estuaries provide a calm refuge from the open sea for millions of plants and animals. The diversity of habitats enclosed in estuaries supports enormous abundance and diversity of species e.g. fish, shellfish, lobsters, marine worms, reeds, seagrasses, mangroves, algae, and phytoplankton. Visiting species include birds which roost and feed, pelagic fish to spawn and use as nurseries.

Agro-ecosystems: An agroecosystem is a cultivated ecosystem, generally corresponding to the spatial unit of a farm and whose ecosystem functions are valued by humans in the form of agricultural goods and services. It is thus co-produced by nature and humans. Agroecosystems are ecosystems composed of both abiotic and biotic elements that interact with each other and the surrounding environment. Agroecosystem are always integrated in a social, economic and ecological environment, and are part of flows (energy, watter) and mechanisms (nutrient cycles, pests and diseases biological control, pollen transfer, etc.). Hence, they are characterized by a structural and dynamic complexity arising from interactions between socio-economic processes (interactions between social and economic factors) and ecological ones (functional links between organisms and their environment) in which hey are embedded. Management of agroecosystems hence seeks for agricultural production systems that reproduce as much as possible natural mechanisms of ecosystems (such as ecological balance between pests and their natural enemies), so that they are moving forward towards agroecological transition.

CONCLUSION

For thousands of years, people have interacted with ecosystems. Many cultures developed around nearby ecosystems. Many Native American tribes of North Americas Great Plains developed a complex lifestyle based on the native plants and animals of plains ecosystems, for instance. Bison, a large grazing animal native to the Great Plains, became the most important biotic factor in many Plains Indians cultures, such as the Lakota or Kiowa. Bison are sometimes mistakenly called buffalo. These tribes used buffalo hides for shelter and clothing, buffalo meat for food, and buffalo horn for tools. The tallgrass prairie of the Great Plains supported bison herds, which tribes followed throughout the year. As human populations have grown, however, people have overtaken many ecosystems. The tallgrass prairie of the Great Plains, for instance, became farmland. As the ecosystem shrunk, fewer bison could survive. Today, a few herds survive in protected ecosystems such as Yellowstone National Park. In the tropical rain forest ecosystems surrounding the Amazon River in South America, a similar situation is taking place. The Amazon rain forest includes hundreds of ecosystems, including canopies, understories, and forest floors. These ecosystems support vast food webs. Canopies are ecosystems at the top of the rainforest, where tall, thin trees such as figs grow in search of sunlight. Canopy ecosystems also include other plants, called epiphytes, which grow directly on branches. Understory ecosystems exist under the canopy. They are darker and more humid than canopies. Animals such as monkeys live in understory ecosystems, eating fruits from trees as well as smaller animals like beetles. Forest floor ecosystems support a wide variety of flowers, which are fed on by insects like butterflies. Butterflies, in turn, provide food for animals such as spiders in forest floor ecosystems. Human activity threatens all these rain forest ecosystems in the Amazon. Thousands of acres of land are cleared for farmland, housing, and industry. Countries of the Amazon rain forest, such as Brazil, Venezuela, and Ecuador, are underdeveloped. Cutting down trees to make room for crops such as soy and corn benefits many poor farmers. These resources give them a reliable source of income and food. Children may be able to attend school, and families are able to afford better health care. However, the destruction of rain forest ecosystems has its costs. Many modern medicines have been developed from rain forest plants. Curare, a muscle relaxant, and quinine, used to treat malaria, are just two of these medicines. Many scientists worry that destroying the rain forest ecosystem may prevent more medicines from being developed. The rain forest ecosystems also make poor farmland. Unlike the rich soils of the Great Plains, where people destroyed the tallgrass prairie ecosystem, Amazon rain forest soil is thin and has few nutrients. Only a few seasons of crops may grow before all the nutrients are absorbed. The farmer or agribusiness must move on to the next patch of land, leaving an empty ecosystem behind.

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Title

Flora and fauna in Sanjhekhali .

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SUBJECT CODE : AECC 2 (ENVIRONMENTAL SCIENCE)

DEPARTMENT : PSYCHOLOGY

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INTRODUCTION

In natural capital accounting, ecosystem are assests that provide ecosystem service to people.Assests can be measured using both physical and monetary units . In the International System of Environmental Economic Accounting , ecosystem assests are generally valued on the basis of the net present value of the expected flow of ecosystem service .

Ecosystem is defined as the community or group of living organisms that live in and interact with each other in a specific

movement. Ecosystem functions have been identified as ecological properties that underly the supply of ecosystem service. However , few studies have managed to quantify ecosystem functions. In the SEEA EEA framework, capacity is a function of ecosystem condition and extent, and it is related to expected service provision sustainable yield . Nevertheless a proper definition of ecosystem is not provided in the SEEA EEA framework . Recent experience show that there is need to better define the concept of capacity and how they can be applied to the different types of services. We first focus on capacity , and subsequently analyses two related concepts , i.e potential supply of ecosystem service and ecosystem capabilities to generate those services.We contrast these definitions with ecosystem service flow , using the definition for ecosystem services from the SEEA EEA framework.

FAUNA IN SANJEKHALI

Sajnekhali Wildlife Sanctuary is a 362 km2 area in the northern part of the Sundarbans delta in South 24 Parganas district, West Bengal, India. It is located at the confluence of the Matla and Gumdi rivers.[2] The area is mainly mangrove scrub, forest and swamp. It was set up as a sanctuary in 1976. It is home to a rich population of different species of wildlife, such as water fowl, heron, pelican, spotted deer, rhesus macaques, wild boar, tigers, water monitor lizards, fishing cats, otters, Olive ridley turtle, crocodiles, Batagur terrapins, and migratory birds

FLORA IN SANJEKHALI

The tree may grow upto 25 km, trunk straight , leaves elliptic , roots with pnumetaphores and blind root sucker , Sundari, gewa or gengwa (Excoecaria agallocha), nipa palms (Nypa fruticans), and other halophytic (salt-tolerant) species are the dominant flora in the mangrove swamps. The Sundarbans region is renowned as a refuge for a variety of animal species, many of them rare and endangered. Much of the area has long had the status of a forest reserve, but conservation efforts in India were stepped up with the creation of the Sundarbans.

swamp, type of wetland ecosystem characterized by mineral soils with poor drainage and by plant life dominated by trees. The latter characteristic distinguishes a swamp from a marsh, in which plant life consists largely of swamp.

CONCLUSION

AS a conclusion , flora and fauna constitute our environment . The human begin is the main responsible of the destruction of flora and fauna . So the people can do many efforts to respect the law of protection of flora and fauna.

It is important because we must live in a healthy environment and to conserve our animal and tree species. Every living creatures play it's distinctive role to support life on the earth. Maintaining a natural balance is essential for the sustenancs of the ecosystem.

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NB
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TOPIC - STUDY OF COMMON BIRDS AND ITS BASIC PRINCIPLE OF IDENTIFICATION

INDEX

INTRODUCTION

"Birds ... are sensitive indicators of the environment, a sort of ecological litmus paper, ... The observation and recording of bird populations over time lead inevitably to environmental awareness and can signal impending changes."

There are about 10,000 species of birds. Some are very tiny, such as the bee hummingbird at two inches tall, and some are very large, such as ostriches, which are nine feet tall. Birds live on all seven continents. The most diversity among birds occurs in tropical regions. Birds belong to a class called Aves, the class of vertebrates all birds belong to. Many species of birds migrate great distances each year, roughly 12,000 miles. They are social creatures, communicating with visual signals, calls and songs. They often participate in social behaviors such as hunting. Sometimes, we will see a number of smaller birds flying after a larger bird. This is called mobbing, and the smaller birds are trying to get the larger bird to leave their nests alone. They share several characteristics with other classes of animals such as a skeletal backbone with a spinal column, a heart with four chambers and warm-bloodedness.

https://ibgnews.com/2017/11/12/memoto-paid-tribute-great-indian-ornithologist-naturalist-salim-ali-birth-anniversary/amp/

COMMON BIRDS AND BASIC PRINCIPLES OF IDENTIFICATION

The queen of air, the Birds, spread their wings and fly in air with their utmost freedom. If we see in Bengal, (Both East and West) is a biodiversity hotspot and represents one of the highest avian biodiversity of the Indian subcontinent. This region is rich in a number of endemic flora and fauna. West Bengal represent an unique region with unparallel natural beauty, amazing ethnic diversity and a spectacular biodiversity of birds. Even in the whole world there are many biodiversity hotspots which are the lovable places for the birds.

FEATURES OF COMMON BIRDS FEATHER

Feathers are an obvious trait. Feathers are found on every living species of bird. They are made of keratin, which also makes hair and nails in other creatures. There are a variety of types of feathers, each with its own function. Soft, downy feathers are essential to keeping birds warm. Contour feathers streamline the body to aid in flying. Flight feathers appear on wings and tail to give loft. Old feathers are molted, or shed, once or twice a year depending upon the species. Feathers help birds find mates. Many male birds, such as peacocks, have very colorful feathers, while the females tend to be more drab.

WINGS

All birds have wings, but not all birds fly. The wings are shaped differently in different species to provide specific advantages. For example, the hawk or falcon has narrow, sharp-tipped wings for speed. Songbirds tend to have elliptical or oval-shaped wings that help them maneuver in tight spaces. Other birds that swim, such as penguins and puffins, have wings that look like flippers to help them 'fly' through the water.

BEAKS OR BILLS

Beaks or bills are another characteristic of birds. These are made from bone and then covered with a very thin layer of keratin. Birds don't have real teeth but some have what is called tomia, which are the sharp ridges along the edges of their beaks. The shape of the beak indicates what that bird's general diet may be. For example, birds, like hawks and owls, that eat meat have sharp, hooked beaks that they use for ripping and tearing. Birds that eat seeds have very strong cone shaped beaks that help them break through shells. Waterfowl, like ducks and geese, have wide, flat beaks so they can strain their food out of the water.

LAYING EGGS

All birds lay eggs. They may be brightly colored, and they may even have spots. Bird eggs have a hard shell made of calcium, which is a mineral used in building bone, and a layer of mucus that hardens as the egg is formed. Inside the egg, we find the yellow yolk and the egg white, which is called the albumin.

ADAPTED SKELETON

Bird skeletons are designed specifically to keep birds light so they can fly. This means their bones are hollow. Some of their bones are fused, or stuck together, which makes their skeleton more rigid than other creatures'. Birds that don't fly, don't need hollow bones. Penguins have heavy bones with marrow in the middle that help them to survive in their very cold environments. Ostriches have heavy, solid bones so they can run and kick to protect themselves.

FLIGHT

Flight is the primary method of transportation for birds. Birds have developed several adaptations for flight. Their bodies are streamlined to reduce air resistance. The breastbone is shaped like a keel, or the bottom of a boat, which allows for the attachment of the large muscles necessary for flight. Many species, such as hawks, combine wing flapping flight with soaring flight, where the wings are held steady, since soaring requires less energy than

flapping. Other species, such as hummingbirds, must flap continuously in order to hover. Because flying requires such large amounts of energy, birds have very high respiratory rates. Birds' body temperature is higher than other mammals, about 104°F or 40°C, which allows their muscles to work about 2.2 times faster. The shape and arrangement of the feathers are what allows birds to fly. Birds also have excellent eyesight and coordination. Approximately 60 species of birds do not fly.

BREEDING

Birds can pair up for one breeding season, such as robins, or sometimes for several seasons, which is called social monogamy. But only a few mate for life, such as bald eagles, which is called monogamy. Some species have one male who meets with many females, like chickens, called polygamy, or one female with many males, which is called polyandry, like some shorebirds, such as the Northern jacana.

HABITATS OF BIRDS

Bird Habitat is the area with ecological and environmental characteristics where a species has adapted to find essential elements such as food, water, shelter, and mates for reproduction.

Birds can fly and are seemingly everywhere, but they occupy specific areas (habitats) that meet all or part of these essential elements.

Ornithologists indicate that "a bird's habitat is often a signature of its identity." Each habitat type has a specific composition and structure to which a species is well-adapted

Wetlands: Bogs, fens, marshes and swamps are all wetland habitats. Wetlands, which support aquatic plants, are essential habitat for many wonderful, often elusive birds. Birds commonly found in wetlands include the iconic great. This adaptation comes as shape and length of the bill, legs, wings, plumage patterns and coloration, and behavior. Going to extremes, one would not expect to see a duck searching for insects in a tree; a duck would be expected in or near water. Its feet and bill are adapted to live in the water. Birdwatchers use habitat as a tool for bird identification. Once the habitat

type to which a species or group of species are associated is known, we will be better able to eliminate other possibilities and identify the birds you see.

Essential elements of bird habitat include:

Forest or woodland: This is the most widespread habitat in North America, but there are many different kinds of forests, each with its own typical birdlife. The birds in a spruce forest usually will be different from those in a forest dominated by oaks and hickories.

blue heron, the secretive sora, swamp sparrows, red-winged blackbirds and common yellowthroats.

Grasslands or prairie: A field of grass might not seem like the best place for birds to raise young, but many species build their nests very low, or even on the ground. Many of our favorite birds rely on grasslands for nesting, and because this habitat is disappearing, some of these species are declining in numbers.

Scrub-shrub: At first glance, scrub-shrub habitat might not look like much. Characterized by low shrubs, short trees and other woody plants, scrub-shrub looks like a forest that failed. Lack of understanding and appreciation of its value has led to a serious loss of this important habitat. Yellow-breasted chats, Florida scrub-jays, field sparrows and blue-winged warblers are just a few of the birds that rely on scrub-shrub to build their nests and raise young.

Backyard: Your yard is automatically going to be a habitat of some kind, and if you think about providing shelter, food and water, it could accommodate many birds! Some of the species that move into backyards readily include Eastern bluebirds, chipping sparrows, Northern cardinals and mourning doves.

Chipping sparrow

Use Habitat to Identify Similar Birds

An awareness of habitat doesn't just help with finding birds—it helps us identify them, too. For example, several kinds of small flycatchers look very much alike, but tend to have different haunts. Willow flycatchers are usually

in scrub-shrub thickets or in willow groves along streams; least flycatchers prefer edges of woods or old orchards; while Acadian flycatchers are found deep inside swamps. These habitat clues are often easier to discern than any field mark.

Birds and Their Habitats

No two species have exactly the same habitat preference. Here are a few examples of birds and their favorite hangouts.

Common loon and chick

Horned lark. Wide-open spaces, like plowed fields, beaches, tundra, desert, plus airports and other areas of short grass.

https://www.featheredphotography.com/blog/2020/03/12/horned-lark-takeoff

Common loon. In summer, Northern ponds surrounded by evergreen forest. In winter, open ocean bays or large lakes.

https://www.thestar.com/amp/news/canada/2016/09/03/canadians-pick-common-loon-as-their-favourite-to-become-national-bird.html

Summer tanager. Forests of oak and pine in the Southeast, cottonwood groves along rivers in the Southwest.

https://www.allaboutbirds.org/guide/Summer_Tanager/id

Cactus wren. Mostly desert areas. Locally, also in dry, brushy woods.

https://ebird.org/species/cacwre

Black oystercatcher. A shorebird that avoids sandy shores, spending its time on rocks pounded by waves.

https://wakayakclub.clubexpress.com/content.aspx?page_id=5&club_id=821680&item_id=31104

Hooded warbler. Understory of rich, moist woods, edges of swamps.

http://www.ikcassady.com/gallery/howa3.htm

Baltimore oriole. Edges of deciduous forest, open groves, parks and towns with lots of shade trees.

https://www.allaboutbirds.org/guide/Baltimore_Oriole/id

Wood duck. Swamps, rivers, ponds surrounded by tall trees.

https://www.birdsandblooms.com/birding/bird-species/ducks-and-geese/wood-duck/

Birds as an Environmental Contributors

https://in.pinterest.com/pin/671951206901638961/

1. Birds control pests

It might be a little extreme to say that we'd be wading knee-deep in invertebrates if birds disappeared – but maybe not that extreme. A recent study has shown that birds eat 400-500 million tons of insects a year. Birds are so efficient that nest boxes have become a pest control practice throughout Europe.

2. Birds pollinate plants

When we think pollinators, bees and butterflies flutter to mind – but bird pollinators such as hummingbirds and honeyeaters also make a big contribution, especially in high altitudes or hot climates. In South Africa, for instance, nearly a quarter of Salvia species are bird-pollinated. Such flowers are lacking in scent, since birds favour sight over smell. Their role as pollinators benefits us directly – around 5% of the plants humans use for food or medicine are pollinated by birds. And when they disappear, the results can be drastic: 31 species of Hawaiian bellflowers appear to have gone extinct along with the birds that pollinated them.

3. Birds are nature's clean-up crew

The sight of vultures circling overhead may look foreboding, but it is both their speed of arrival (typically within an hour of death), and their thoroughness which makes them so valuable. It could be days before other less efficient scavengers, such as feral dogs or rats, arrive to pick at the remains, allowing deadly diseases such as rabies and tuberculosis to develop and spread.

4. Birds spread seeds

When birds travel, they take the seeds they have eaten with them and disperse them through their droppings. They bring plants back to ecosystems that have been destroyed, and even carry plants across the sea to new land masses. Birds have helped to shape the plant life we see around us – and around the world.

5. Birds transform entire landscapes

Habitats like forests, marshes and grasslands affect people across the whole planet, even those living hundreds of miles away – they store carbon, keep the climate stable, oxygenate the air and transform pollutants into nutrients. But without birds, many of these ecosystems may not exist. Birds maintain the delicate balance between plant and herbivore, predator and prey.

6. Birds keep coral reefs alive

Birds, especially seabirds, play a key role in cycling nutrients and helping to fertilise marine ecosystems such as coral reefs. Seabirds travel hundreds of kilometres to feed out in the ocean – and when they return, they deposit layers of highly pungent guano (seabird droppings) at their colonies. This guano leaches into the ocean and fertilises nearby communities such as coral reefs.

7. Birds inspire science

From the technology of flight, to the invention of zippers modelled on the barbules of feathers, humans have drawn inspiration from birds for centuries.Birds are the messengers that tell us about the health of the planet. Birds are widespread and respond quickly to changes in the environment. Because of this, they are our early-warning system for pressing concerns such as climate change.

Common Birds - RIGHT TO BE SAFE

Across the Americas, more than 500 native bird species are threatened with extinction — 12 percent of 4,230 species. In the United States alone, nearly 300 of 750 native bird species, or 37 percent, are declining in

population.

https://myloview.com/posters/theme/save-birds/

It's easy to get involved in bird conservation, and like anything, some of your most helpful actions begin at home. Environment for the Americas surveyed biologists, educators, conservationists, birdwatchers, and bird enthusiasts to get their best ideas for getting involved in bird conservation.

1. Prevention of Bird Collisions with the Windows Collisions are one of the most frequent causes of bird deaths. Birds see nature reflected in the window or mistake houseplants inside the building for outdoor plants and fly into the glass. Putting up curtains or window decals helps make the window visible to birds.

https://www.theindia.co.in/places/dr-salim-ali-bird-sanctuary-goa

2. Protection of Birds From Pets Unleashed dogs and outdoor cats can harm birds by disturbing, chasing, and even killing them. Keeping your cat indoors and your dog from straying saves millions of birds each year.

3. Use Cloth Grocery Bags and Reusable Bottles Birds that mistakenly eat plastic trash can become ill or even die. Avoiding plastic bags and bottles reduces plastic pollution and conserves resources.

4. Restore Natural Habitat in Your Community Birds need a place to live and many bird habitats are disappearing. City parks and open spaces are natural places for birds. Work with your community to recreate the habitat that once existed in your area.

5. Keeping Distance

Birds, need space for feeding, nesting, and other daily activities. Approaching too closely may cause them to become nervous and deplete much-needed

energy reserves. During the nesting season, it may even result in loss of eggs or young to predators.

6. Slowing Down When Driving

Cars kill millions of birds each year. Driving slowly gives you more time to respond if there is an animal in the road and gives the animal plenty of time to get out of the way.

7. Planting Native plants

Native plants provide food, nest sites, and cover for birds.

8. Reduce Energy

Use Riding your bike or walking reduces your carbon footprint and prevents pollution of bird habitats. Switching off the lights in your house not only shrinks your energy bill, but can also help prevent birds from colliding with your windows.

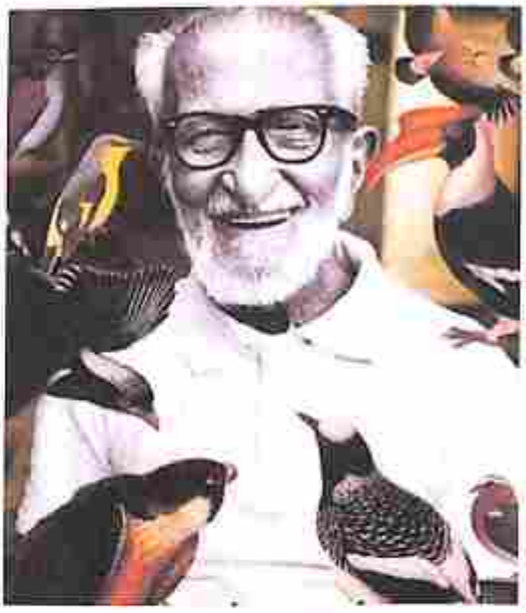
9. Avoid Chemicals

Birds may accidentally eat pesticide and herbicide pellets or prey that have been poisoned. This can kill a bird or have toxic effects on their own health and that of their growing embryos, including deformation or suppressed immune systems.

Making of Birds sanctuary

Federal and local laws protect sensitive areas and manage the harvest of birds to ensure healthy populations. It contributes to habitat which benefits all birds.

CONCLUSION



If we see the works of the great ornithologist and naturalist, Dr. Salim Ali, "The Birdman of India " the contribution of him for birds and the birds contribution to the whole world ,will be notable. The birds are very important for our biodiversity and even for the very survival of human beings. They play vital role in different ecosystems at different different tropic levels. So in order to give the birds a good life, the national parks, Sanctuary, and bioreserves should be made .Thus if we can do so we can keep our Earth decorated with the most beautiful, most musical,most admired, most watched, most defended creatures.

https://ibgnews.com/2017/11/12/mamata-paid-tribute-great-indian-ornithologist-naturalist-salim-ali-birth-anniversary/amp/

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20/6/2022

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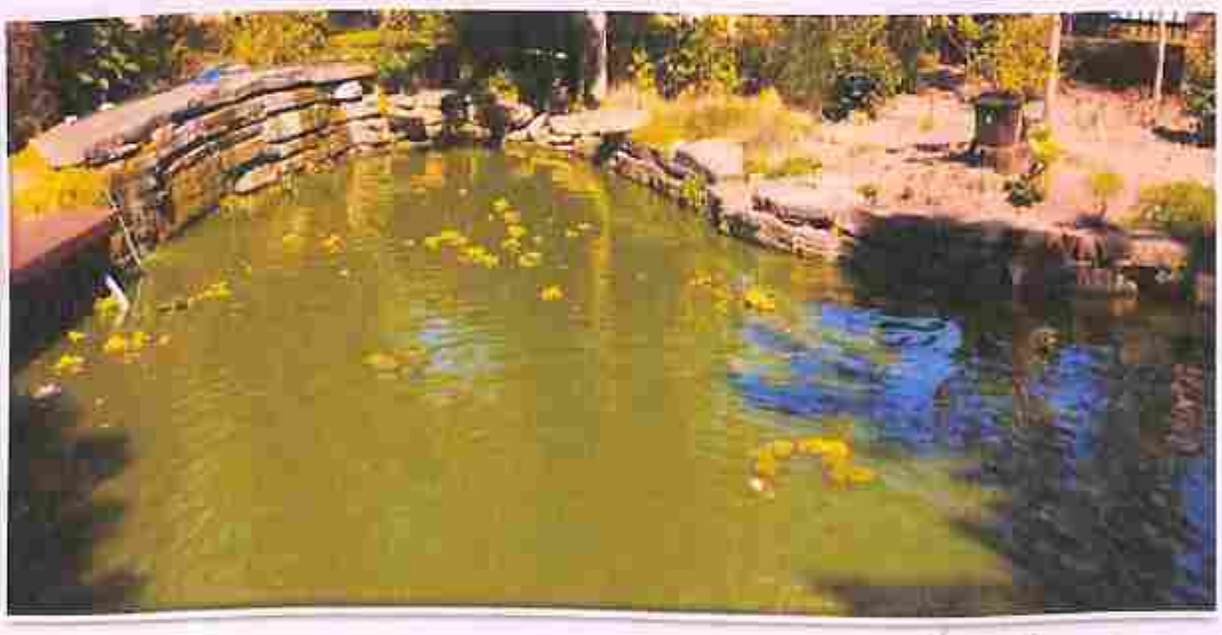
Subject Code: AECC-2

College Name: Gokhale Memorial Girl's College

INDEX

TOPIC: Study of Simple Ecosystem (Pond)



thepondexperts.com

INTRODUCTION

A pond is a highly dynamic mini ecosystem. This change rapidly during the year. To study a pond we should, as far as possible, cover all its phases.

i. The monsoon face, when the pond changes from a dry to wet (aquatic) state.

ii. The growing face, when it is colonised by micro flora and fauna and then other forms of microscopic life.

iii. The mature aquatic face, at the height of the monsoon when it is full of life. In dry season the pond begins to shrink. Its periphery becomes dry and in colonised by grasses and herbs. Its aquatic flora and fauna dies, giving place to land – flora and fauna. Eventually it may only remain in the form of a ditch containing dormant aquatic invertebrates such as insects that must await the next monsoon.

OBSERVATION

The colour of the water of the pond is greenish. It indicates the presence of plankton (phyto plankton and zoo plankton). The water id slightly turbid which indicates the presence of find suspended particles.

Musty taste and grassy odour indicates the presence of algae, bacteria and paphogens. The ecosystem of the pond has been studied.

Pond is a fresh water self regulated typical ecosystem.

A.ABIOTIC COMPONENTS: All non-living components of a pond are called as abiotic components. These are water, oxygen, carbon dioxide, nitrogen, calcium, phosphorus and their compound, humic acid, amino acid etc. The light, temperature, pH, salinity etc. Of the pond ecosystem also are the abiotic components.

B.BIOTIC COMPONENTS: On the basis of the depth of water of the pond and types of vegetation and animals of the ecosystem there may be three different zones in a pond-littoral, limnetic and profundal. The littoral zone is the shallow water region which is occupied by rooted plants including grasses. In the limnetic zone associated organisms are green and blue algae, a variety of zoo plankton, small crustaceans, fishes, amphibians and larger insects. In the deep water parts profundal zone there is no effective light penetration. The associated organisms are snails, mussels, crabs, worms.

i. **Producers:** There are two types of producers which are present in pond ecosystem are microphytes. Microphytes are minute – floating plants i.e. phytoplankton, algae like Oedogonin, Spirogyra, Ulothrix, etc. are included in this group.
Microphyts grow in shallow water and they are partly or completely submerged rooted large plant. Plants like Hydrilla, Vallisneria, Trapa, Typha, etc. are included in this group of microphytes. Azolla, Pistia, Wolffia- are some free – floating microphytes.

ii. **Consumres:** The common primary consumers are of two types – **a)** Zoo plankton and **b)** Benthos.
Amoeba (a protozoan, Daphnia etc.) constitute the zooplankton while snails, small fishes etc. constitute the benthos. They are called primary consumers as they feed on green plants and algae. Frogs, Big fishes, Water snakes, Crabs etc. are the secondary consumers which consume primary consumers.

iii. **Decomposers:** A large number of fungi and bacteria attack dead bodies of the aquatic plants and animals and convert the complex organic substances into simpler inorganic compounds and aliments. The chemical elements which are liberated by decomposers are again utilised by green plants in their nutrition.

CONCLUSION

Pond as a whole is considered to be a very good example of fresh water ecosystem. It exhibits a self-sufficient, self-regulating system and serves as a perfect field to study natural ecosystem.

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ACKNOWLEDGEMENT

I express my deep sense of gratitude to Prof. Namrata Basu of ENVS Dept. for providing necessary guidance and suggestion for the field work.

I am thankful to my classmates of my team for their friendly assistance.

Date 26.05.2022

Monoswita Palchowdhury

Signature of the Student

NB 20/1/2022

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- COLLEGE ROLL NO.-21-BSCH-0202
- UNIVERSITY ROLL NUMBER-213013-11-0072
- REGISTRATION NUMBER-013-1211-0216-21
- TOPIC-DOCUMENTATION ON ENVIRONMENTAL ASSETS:FLORA AND FAUNA
- FULL NAME-SULAKSHANA DAS
- HONOURS DEPARTMENT-PSYCHOLOGY
- COLLEGE-GOKHALE MEMORIAL GIRLS' COLLEGE.

DOCUMENTATION OF ENVIRONMENTAL SCIENCE: FLORA AND FAUNA

ACKNOWLEDGEMENT

I would like to thank my teacher (name of teacher) who gave me this opportunity to work on this project. I got to learn a lot from this project about (what you learned from the project). I would also like to thank our school principal (name of principal).

At last, I would like to extend my heartfelt thanks to my parents because without their help this project would not have been successful. Finally, I would like to thank my dear friends who have been with me all the time.

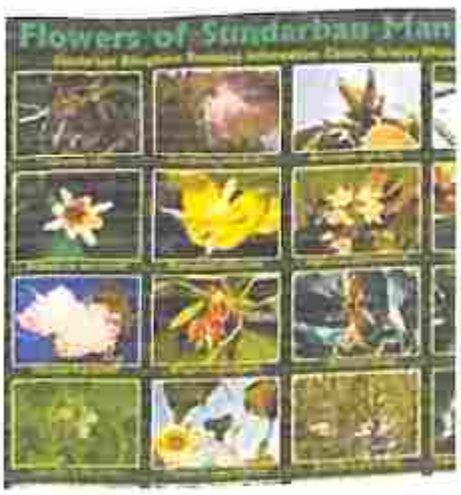
Contents

INTRODUCTION

Definition of Environmental Assets

Naturally occurring entities that provides environmental "functions" or services. Environmental assets in the SEEA are broader than environmental assets in the SNA: they cover all assets including those which have no economic values, but bring indirect uses benefits, options and bequest benefits or simply existence benefits which cannot be translated into a present day monetary value.

There are seven individual components of the environment that are considered environmental assets in the Central Framework. They are **mineral and energy resources, land, soil resources, timber resources, aquatic resources, other biological resources (excluding timber and aquatic resources), and water resources.**



FLORA AND FAUNA

OF THE SUNDARBANS

The Sundarbans is considered as the largest remaining area of mangroves forests in the world. It provides one of the most affluent ecosystems in the world. It is extremely rich with large diverse scale of flora and fauna. The Sundarbans is the home of more than 300 species of plants, 400 species of fisheries and 270 species of birds. Other than the home birds, it also provides shelter to the migratory wither birds and gulls. The Sundarban is the prime habitat of the national animal of Bangladesh, the Royal Bengal Tiger, which is a rare animal in the whole world (Ministry of Environment and Forest, Government of Bangladesh, 2005, p. 5). 'The Sundarbans were declared as Sundarban Reserve Forests in 1876 and as a Natural World Heritage Site by the UNESCO in 1997 to conserve all its unique flora and fauna' (Aziz & Paul, 2015, p. 260).

Some of the more popular birds found in that region include: Open Billed Storks, White Ibis, Water Hens, Coots, Pheasant Tailed Jacanas, Pariah Kites, Brahminy Kites, Marsh Harriers, Swamp Partridges, Red Jungle Fowls, Spotted Doves, Common Mynahs, Jungle Crows, Jungle Babblers, Cotton Teals, Herring Gulls, Caspian Terns, Gray Herons, Brahminy Ducks, Spotted Billed Pelicans, Large Egrets, Night Herons, Common Snipes, Wood Sandpipers, Green Pigeons, Rose Ringed Parakeets, Paradise Flycatchers, Cormorants, Fishing Eagles, White Bellied Sea Eagles, Seagulls, Common Kingfishers, Peregrine falcons, Woodpeckers, Whimprels, Black-Tailed Godwits, Little Stints, Eastern Knots, Curlews, Golden Plovers, Pintails, White Eyed Pochards, and Whistling Teals.

Some of the fish and amphibians found in the park's waters include Sawfish, Butter Fish, Electric

lver carp, Star Fish, Common Carp, King Crabs, Prawn, Shrimps, Gangetic Dolphins, ng Frogs, Common Toads, and Tree Frogs.

Sundarbans National Park hosts an abundance reptiles as well, including Olive Ridley urtles, Sea Snakes, Dog Faced Water Snakes, Green Turtles, Estuarine Crocodiles, Chameleons, King Cobras, Salvator Lizards, Hard Shelled Batgun Terrapins, Russell's Vipers, Mouse Geckos, Monitor Lizards, Curviers, HawksBill Turtles, Pythons, Common Kraits, Chequered Killbacks, and rat Snakes.

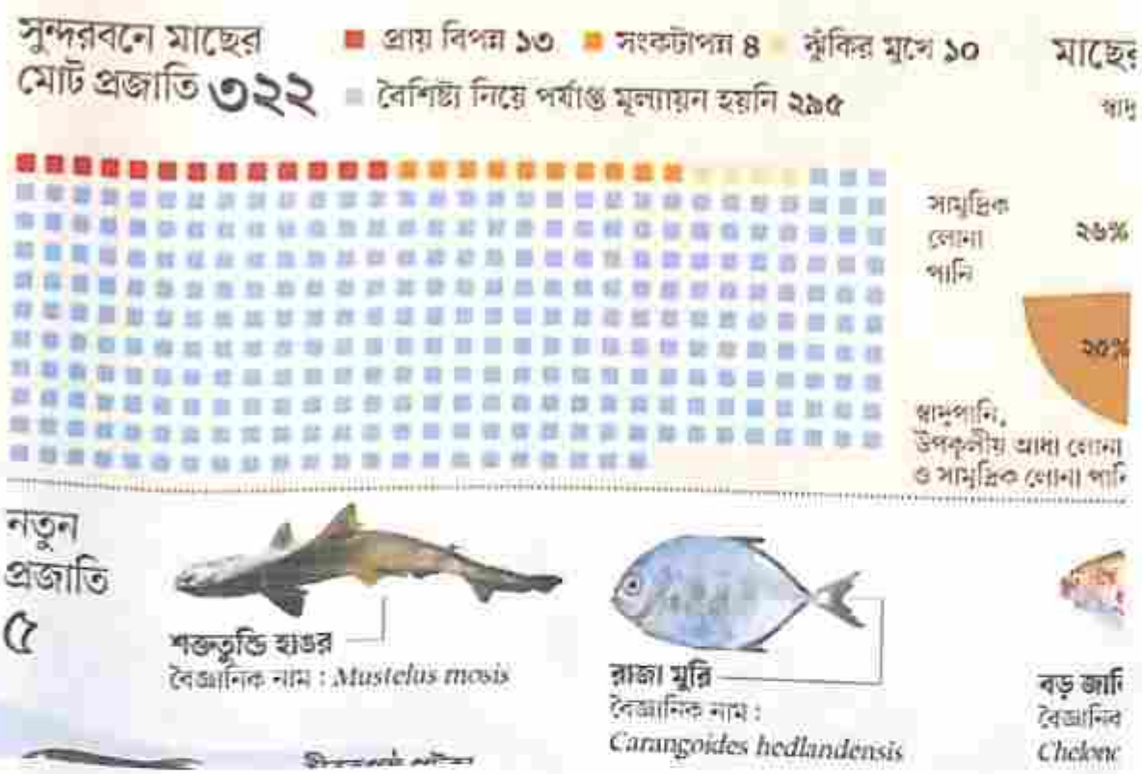
Royal Bengal Tiger, Estuarine Crocodile, River Terrapin (Batagur baska), Olive Ridley Turtle, Gangetic Dolphin, Ground Turtle, HawksBill Turtle and King Crabs (Horse shoe) number among the endangered species living within the Sundarbans.

FAUNA OF SUNDERBANS:

Great Egret, Sundarbans

Birds of sunderbans

Snakes of sunderbans



LORA OF NDERBANS:

Sonneratia cascolaris

Bruguiera gymnorhhiza

Stilt roots

Heritiera fomes

Pneumatophore

Nypa

Perforated bark

Phenology of Dominant Mangroves of Sundarban Kalo Baine (Avicennia alba) Fruit : greyish green capsule of about 1 inch in length, contains one seed Fruiting time : September – December

Avicennia alba

Peara Baine (Avicennia marina) Fruit : Greyish green capsule , about I inch in length. One seed. Fruiting time : August – September

Avicennia marina

Jhamti Garan (Ceriops decandra) Fruit :Viviparous with thin, long, hypocotyls Fruiting time : July – August **Jat Garan (Ceriops tagal)** Fruit : Viviparous with thin, long hypocotyls Fruiting time : July – August **Ora / Chak Keora (Sonneratia caseolaris)** Fruit : spherical berry with numerous seeds Fruiting time : August – October

Sonneratia caseolaris

Gol Pata (Nypa fruitcans) Fruit : Large fruiting head Fruiting time : March- April

Nypa

Geoa (Excoecaria agallocha) Fruiting time :June – September

Excoecaria agallocha

Khalsi (Aegiceras corniculatum) Fruit : Curved, viviparous. Pericarp splits vertically Fruiting time : July – September

Aegiceras corniculatum

Sundari (Heritiera fomes) Fruit : Large, spherical, corky, leathery. Splits into 4 when dry Fruiting time : August-September

Heritiera fomes

Pasur (Xylocarpus mekongensis) Fruit :Large, spherical, corky, leathery, splits into 4 when dry. Fruiting time : July – September

Xylocarpus mekongensis

Dhundul (Xylocarpus granatum) Fruit : Large ,spherical , corky , leathery. Splits into 4 when dry. Fruiting time : August **Tak Keora (Sonneratia apetala)** Fruit : Spherical berry with numerous seeds Fruiting time : August-September **Kankra (Bruguiera gymnarrhiza)** Fruiting time : June – September

Bruguiera gymnarrhiza

Garjan (Rhizophora apiculate) Fruit : Green or brown viviparous fruits, contains one seed Fruiting time : March-April and again in August- September

Though Salinity is one of the problems in that area that has a great impacts in the ecosystem, its flora and fauna, but ultimately also its people. These salinity rises have many negative impacts on aquatic species especially on their reproduction. Ultimately it affects fish abundance and fish migration that will affect the livelihood of the people who depend on fishing for food and income (Dasgupta, Huq, Mustafa, Sobhan, & Wheeler, 2016, p. 3). Therefore, the overall goal of this research is to study how salinity is affecting the flora and fauna, and as a consequence, how increasing salinity impacts the livelihood of the people.

FOR UNDERSTANDING THE SALINITY PROBLEM OF SUNDERBANS,THE FOLLOWING MUST BE POINTED FIRST

1.1 Geographical Description and Composition of Forest

The area of the Sundarbans is about 10,000 km2, which is shared by Bangladesh and India. Among the total area, about 6,000 km2 are in the southwest part of Bangladesh and the rest are in India

Getzner & Islam, 2013, p. 75).

Among the Bangladeshi part of 6,000Km2 (approx.), about 4100 km2 are landmass and remaining 1900 km2 are water bodies (e.g. rivers, canals and creeks) (Rahman & Asaduzzaman, 2010, p. 37). There are three wildlife sanctuaries in the Bangladesh Sundarban Mangrove Forest (BSMF):

i) Sundarbans West Wildlife Sanctuary;

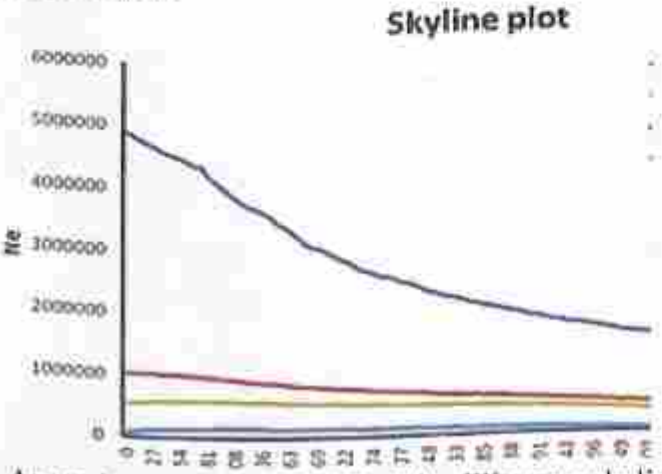
ii) Sundarbans East Wildlife Sanctuary;

and

iii) Sundarbans South Wildlife Sanctuary.

The areas of these sanctuaries are 71,502ha, 31,226ha and 36,970ha respectively. The sanctuaries are situated in the islands of Sundarban Forest Division, Khulna which are west of the river Ganges, Brahmaputra and Meghna. (Rahman & Asaduzzaman, 2010, p. 37). Barren lands are sandy surface, grasslands are formed with small wood plants, vegetation is referred as dense mangrove and non mangrove plantation and water bodies are river channels (Mondal, 2017, p. 9).Different land covers in Sundarbans (Mondal, 2017, p. 9) According to the Landsat images of the Sundarbans, between 1973 to 2010 (Table 1). It is found that area of grasslands increased while area of vegetation lands had decreased.

2. Population



As per latest census of 2011, 7.8 million people live in the different districts of Sundarbans impact zone (SIZ) and in the sub districts of SIZ, the population is 2.16 million (The population from the first census in 1974 had been increased except a slight decrease in 2011 (Mondal, 2017, p. 5). Population size in Sundarbans Impact Zone (SIZ)

(Mondal, 2017, p. 5) The population growth (in %) in the SIZ districts are mostly positive (Table 2). Table 2. Population growth rate in SIZ districts (Mondal, 2017, p. 5) Generally, the structure of population in terms of size and composition depends on the allocation of the natural resources as it provides food and means of livelihood to the people. Therefore, where the woods, plants and fresh water are more available, people like to start staying there. It is found in the forest inventory between 1983-1996, with an increase of 20% population in SIZ, the number of trees in the Sundarbans Reserve Forest (SRF) had been decreased by 25%. In the rural part, this percentage is high, because poor people are more dependent on forest resources (Mondal, 2017, p. 10).

2. Problem Formulation

Salinity is an important impediment on the growth of mangrove forest and distribution. The physiographic nature of the soil and water is being changed by the salinity intrusion, which affects supporting services of the flora, fauna and fisheries such as habitat. Therefore, habitat loss of plants and animals are occurring frequently for salinity intrusion. The nursery ground to breed for fisheries is also diminishing. (Haque & Reza, Salinity Intrusion Affecting The Ecological Integrity of Sundarbans Mangrove Forests, Bangladesh, 2017, p. 140). The agricultural lands are seriously affected by salinity because most crops like rice, 4 wheat, etc. require fresh water. Salinity in the water will seriously hinder the irrigation process in agricultural lands (Haque & Reza, Salinity Intrusion Affecting The Ecological Integrity of Sundarbans Mangrove Forests, Bangladesh, 2017, pp. 140-141). The most importantly, the people who are dependent on the agriculture and fisheries for their food and livelihood are more vulnerable due to this salinity intrusion.

2.1. Background of the Problem

Global climate change is affecting the whole country due to the geographic characteristics of Bangladesh being a low-lying coastal country. As a consequence, the sea level is rising and the fresh water resources are becoming more saline. The change or increase in temperature is also leading to greater evapotranspiration water and thus raising salinity levels in the remaining fresh water bodies (rivers) and aquifers (IPCC, 2014). Rainfall and Himalayans river flow are also affecting the salinity balance of the water bodies in the Sundarbans. With this natural reasons, there are some man made reasons of increasing salinity such as building dam, extortion of soil and water, deforestation and so on.

Effects on Salinity on Flora

The salinity level in the rivers and canals are increasing specifically in dry season due to lack of fresh water inflow into the Sundarbans, which is negatively impacting on flora and fauna of the area.

i) Top Dying diseases

The major mangrove species are dying as a consequence of salinity. 'Top Dying' is a type of disease, which is prominent in the 'Sundari' tree (Heritiera fomes).

ii). Loss of species due to transformation in saline zone Salt is a barrier for absorbing water for a plant. If there is a high salt concentration in the moist soil, it creates water stress and drought, which ultimately is the reason of death for the mangrove trees. There are two following zones in terms of salinity in Sundarbans:

1. Mesohaline zone: This is moderately saline zone, the salinity level is 6,250 to 12,500 micromhos. In this zone, 'Gewa' (scientific name Excoecaria agallocha) is the dominant species.

2. Polyhaline zone: The zone is saline and the salinity level is exceeding 12,500 micromhos. 'Goran' (Scientific name Ceriops decandra) is the dominant species here (Participatory Research and Development Initiative).

3..There is another zone named **oligohaline** where 'Sundari' is the dominant species. The salinity penetration in the soil is the reason of transforming oligohaline to mesholine area and meshohaline to the polyhaline area according to several research report (Participatory Research and Development Initiative).

The Salinity in the agricultural lands is considered as an important factor for reducing yields and limiting crop production. Many agricultural regions in the Sundarbans became less productive for the increased soil salinity in the last couple of years. For example, in the Asasuni upazila, Satkhira district, one of the important rice production regions of Bangladesh, the rice production has been reduced tremendously. It is found in different salinity surveys, various levels of soil salinity affected 70% of cultivated lands (approximately 1.02 million hectares) in the south coastal parts of the country (Haider & Hossain, 2013, p. 417).

Positive effect of salinity in the growth

The growth and development of mangrove species is hindered by high salinity. The structural development is also negatively affected by salinity stress. However, in a survey, it was aimed to find the salinity effect on several mangrove species. There, the major dominant species H. fomes showed that increasing soil salinity has a negative effect on their growth. Other species were found to show positive response with the increased salinity.

CONCLUSION:

From one of the researches it has been found that

Solution: Management of fresh water Salinity is increasing due to sea level rise and the lack of fresh water from the rivers. The barrages and dams are one of the main reasons for lowering fresh water inflow. Bangladesh Government is on the way of negotiation regarding the water sharing of Ganges river with the Indian Government. If Bangladesh gets their equitable share according to Agreement on sharing of the Ganges water, the supply of fresh water will increase significantly (Kawser & Samad, 2016). As a major livelihood sources, the farming and fishing are affected by the salinity and posing threat to the people who are dependent for their livelihood on these. Farmers are using chemicals to reduce the salinity, but affect the soil, which is unsustainable, and in the long run, destroying soil. Therefore, an alternative livelihood means can boost the mangrove ecosystem and at the same time ensures the livelihood of the people. Honey processing is a good opportunity to make livelihood. Though some people are engaged with this, the amount is little. There are many demand of honey from Sundarbans to all over the country. Bottling plants, wax processing can also be some alternative livelihood trend. Another important sector of livelihood source can be Tannin and dye processing. The leather and chemical industries of Bangladesh use dyes and most of them are chemically formed. While, some barks of the mangrove species provide natural colour.Medicines can be produced form many mangrove species. Therefore, the barks of such mangrove species can be used to produce eco-friendly gums, which will also ensure the livelihood of the coastal people who earlier depended on the fishing. The leaves of some mangrove species such as Golpata (Nypa fruticans), Hental (Phoenix paludosa) are very potential to make handicrafts, ropes, roofs of the hut and so on. Therefore, as tourists visit Mangrove forests, small-scale industry of these handicrafts, mats and other products made form the leaves can be great source of livelihood. Therefore, introduction of technology for the production, marketing interventions are necessary to make these attempts successful (Datta, Chattopadhyay, & Deb, 2011, p. 541). 5.1.3. Change of fuel for cooking With the increased population in the Sundarbans, the number of trees is reducing. People use wood as a fuel for cooking. The destruction of wood causes habitat loss of flora and fauna. It also destroys the ecological balance. Biomass energy using garbage and crop waste can be an alternative option for cooking.. Sustainable Foods form agriculture and plants are an important part for the marginal people in the Sundarbans. Almost all respondents stated that they depend on the natural resources for their food. With these, salinity problems are affecting the vegetation process. Therefore, sustainable farming is important which also provide eco-friendly diet. Integrated farming is an example of sustainable farming where growing crops with many types of vegetables and a small fishpond together by a group of people. Wild Mushrooms, fungal flora can be good source of protein and less affected by salinity.Monitoring the changes is important to make some sustainable effort. Remote sensing, GIS technology should be used to get some accurate picture, which would be helpful to Figure out the changes and progresses are done in the ecosystem .

Nylon net fencing and solar illumination of villages, along with other measures, has helped prevent the straying of tigers into nearby villages. The village youth have been receiving training on controlling the straying of tigers into the villages.

The Mangrove Interpretation Centre has been established at Sajnekhali to foster awareness among the local people and tourists about importance of conservation of nature in general and specially the mangrove eco-systems.

Though tough laws protect the park, a few loopholes exist. The geographical topography with jungle wilderness terrain criss-crossed by several rivers and their tributaries, a long international border with Bangladesh, fishing trawlers and launches makes complete control of poaching and cutting of the mangrove forests for fire wood, difficult. Lack of park staff, infrastructure and funds contribute to the gaps in protection of the park.

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The sources from which i took help to get the informations and the pictures to complete this project are

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- https://whc.unesco.org/en/list/798/
- https://en.banglapedia.org/index.php/Sundarbans,_The

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SEMESTER – II

UNIVERSITY ROLL NO. –213013-11-0097

REGISTRATION NO. – 013-1211-0253-21

SUBJECT – ENVIRONMENTAL STUDIES

SUBJECT CODE – AECC 2

COLLEGE – GOKHALE MEMORIAL GIRLS' COLLEGE

INDEX

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STUDY OF ECOSYSTEMS – POND, RIVER, WETLAND, FOREST, ESTUARY AND AGRO ECOSYSTEMS {FOREST }

INTRODUCTION

MORE ABOUT ECOLOGY :

Ecology is the study of organisms, their environments, and how they interact with one another and with their surroundings. Ecosystems are an aspect of ecology's subject matter. The interactions between living species and the physical surroundings in which they live form ecosystems.

TYPES OF ECOSYSTEM :

An ecosystem (or ecological system) consists of all the organisms and the physical environment with which they interact. Each organism in an environment does have its own specialty or role to fulfil; they are the biosphere's underpinnings. The integration between both biotic and abiotic natural systems focuses on the organization of an ecosystem. Ecosystems can be any size, although they are usually places, such as a forest or a little pond.

There are two types of ecosystem:

- Terrestrial Ecosystem.
- Aquatic Ecosystem.

Types of Ecosystem with examples

1.Natural:Terrestrial

Grassland

Forest

Desert

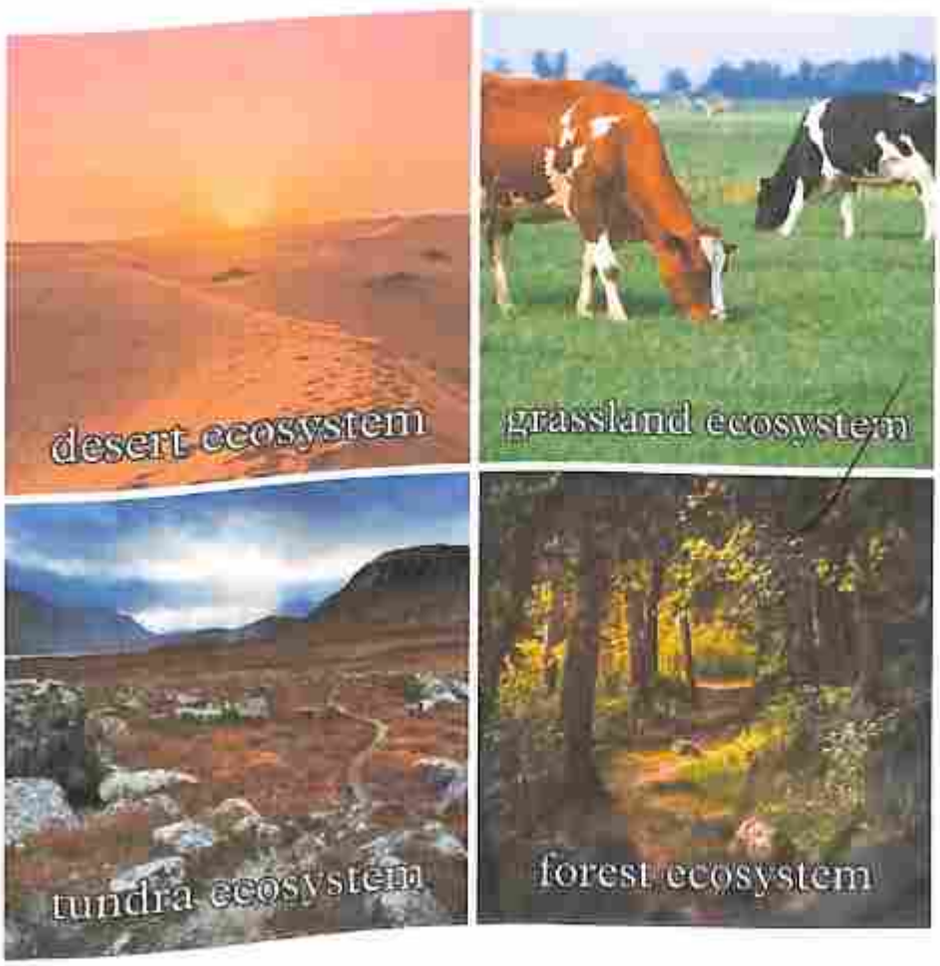
Natural:Aquatic

a)Marine:Oceans

b)Lakes

Terrestrial ecosystems are exclusively land-based ecosystems. There are different types of terrestrial ecosystems distributed around various geological zones. They are as follows:

- Forest Ecosystem.
- Grassland Ecosystem.
- Tundra Ecosystem.
- Desert Ecosystem.

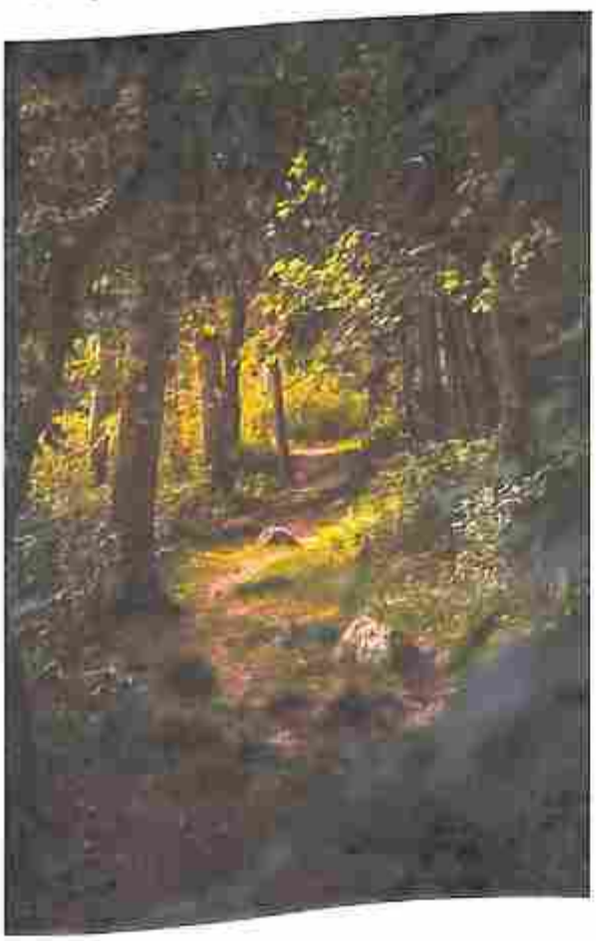


INTRODUCTION TO FOREST ECOSYSTEM :

Forest Ecosystems are part of the terrestrial ecosystem. A forest ecosystem is really a nonlinear entity of plant, animal, and microbe habitats, as well as their biophysical environment, that operate and function as a system component, with trees as a fundamental component. Forest ecosystems are made up of a variety of species, geology, topography, and climate that are all linked by physical and biotic processes unique to each location, and are dominated by trees as the dominating vegetation. Forest ecosystems have been classified into many varieties based on the climate patterns of the location – for example, tropical rainforest, temperate, and so on. The world's forest ecosystems provide critical and diverse services and values to human society. As primary habitat for a wide range of species, forests support biodiversity maintenance and conservation. Forest growth sequesters and stores carbon from the atmosphere, contributing to regulation of the global carbon cycle and climate change mitigation. Because of the global influence of their photosynthesis, forests are essential sources to the Planet's efforts to withstand its environment. Healthy forest ecosystems produce and conserve soil and stabilize stream flows and water runoff—preventing land degradation and desertification, and reducing the risks of natural disasters such as droughts, floods, and landslides. Forests also serve as sites of aesthetic, recreational, and spiritual value in many cultural and societal contexts, and contribute to poverty eradication and economic development by providing food, fibre, timber, and other forest products for subsistence and income generation.

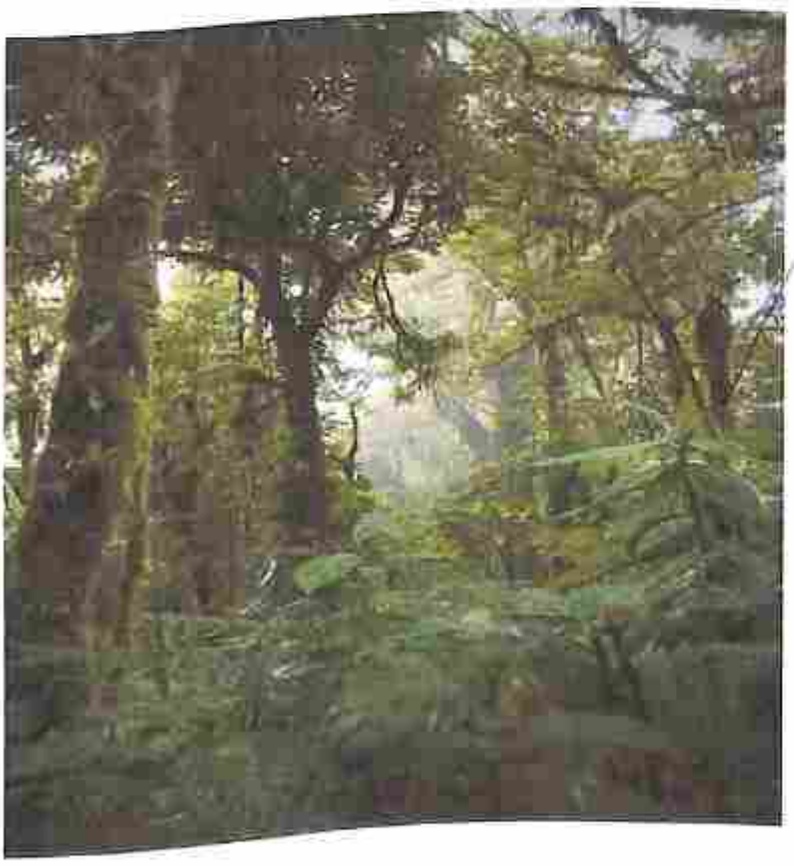
TYPES OF FOREST ECOSYSTEM :

- **Temperate Forest Ecosystem.**

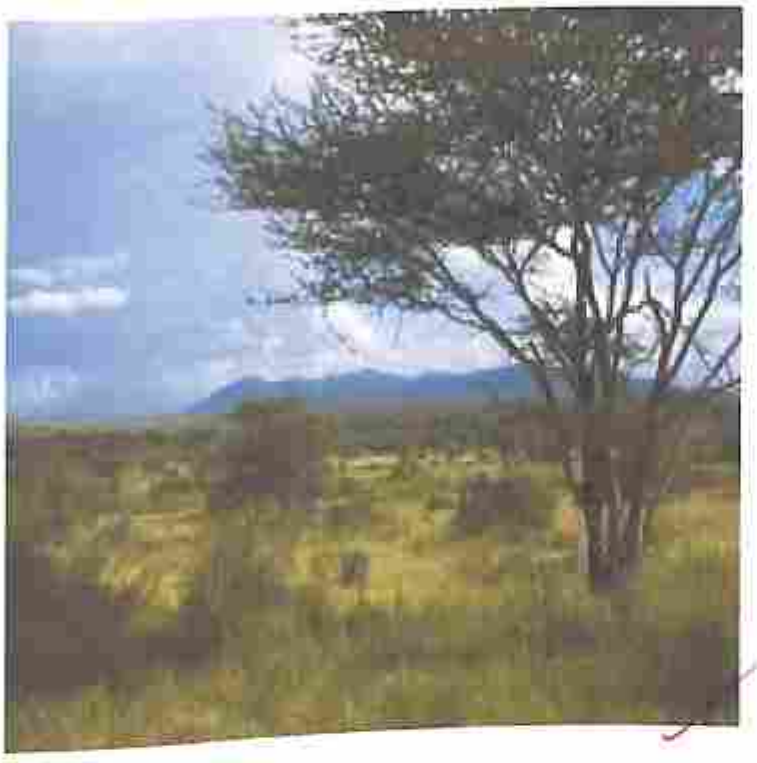


• **Boreal Or Taiga Forest Ecosystem.**

• **Tropical Rainforest Ecosystem.**

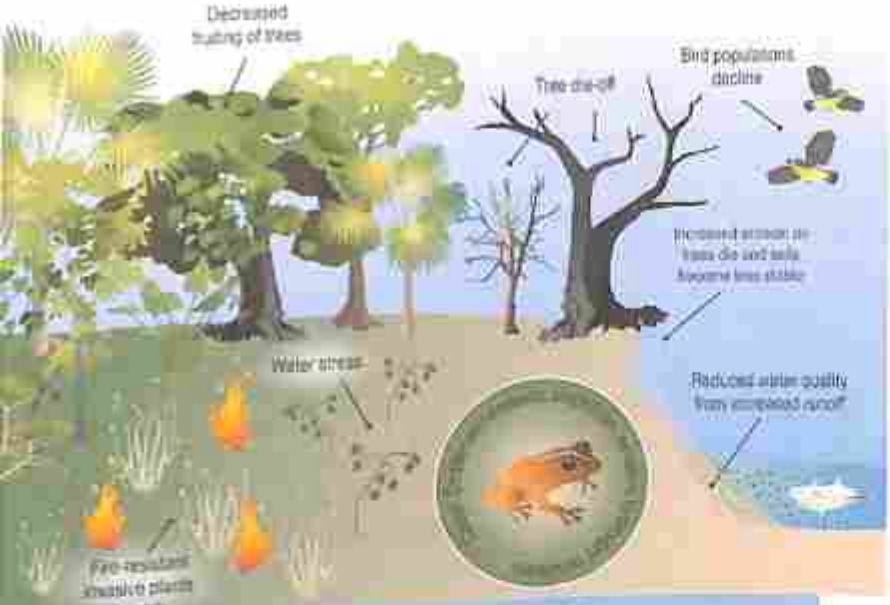


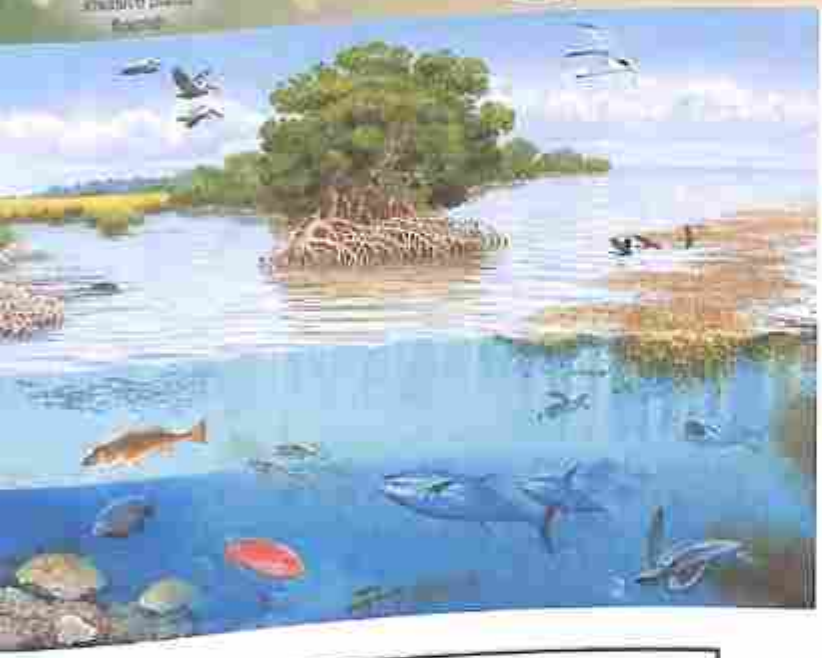
• **Savanna Forest Ecosystem**

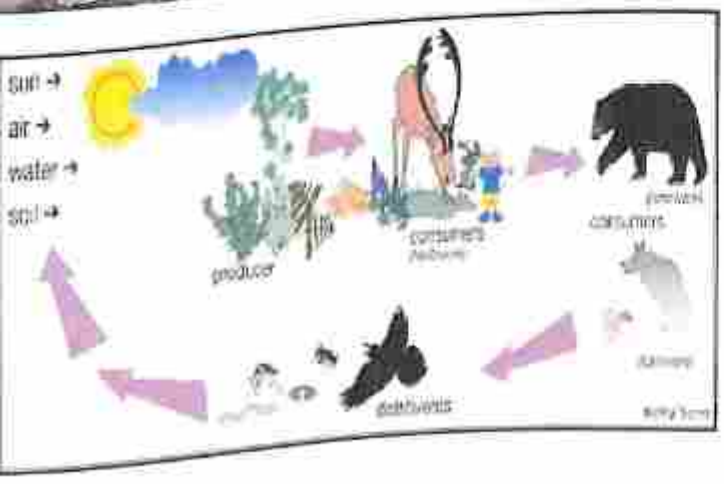


INSIGHTS

s are more than collections of living and non-living things found in the same place. are also made up of many components features which include Productivity, mposition, Energy Flow, Nutrient Cycling, etc. Their many components are connected ach other as food chains of interdependence. Food chains move the basic requirements for —energy, water, carbon, air, and nutrients—in a series of connections and processes. All d chains consist of: Producers—organisms that produce energy, Consumers—organisms that consume producers and other consumers Decomposers—organisms that consume producers and consumers, and provide nutrients into the soil. Applying the system above to a simple real-world example is as follows: Producer: grass (produces energy from the sun and nutrients) Consumer: deer (eats grass) Decomposer: worms (eats deer, creates nutrients from which grasses can grow). The sun provides energy to the forest. Trees and other plants (producers) use photosynthesis to transform the sun's energy into glucose (sugars). Consumers—plant-eating animals such as caterpillars, chickadees, and deer, and animal-eating predators such as coyotes, woodpeckers, and spiders—get their energy from other living things. Decomposers such as sowbugs, fungi, and bacteria get their energy from dead plants and animals. Forests cover about one quarter of the world's land surface, excluding Greenland and Antarctica. Just over half are found in developing countries. Global forest cover has been reduced by at least 20 percent since preagricultural times, possibly by 50 percent. Forest area has increased slightly since 1980 in industrial countries, but has declined by at least 10 percent in developing countries. Tropical deforestation rates are uncertain, but probably exceed 130,000 km2 per year. About 40 percent of forests are relatively undisturbed by human activity, though nearly half of these are likely to be developed soon. Nearly all forests in Europe and the United States are under some degree of management. Mixed forest/agriculture zones are spreading rapidly at the edges of formerly intact forest, but this form of land use change is often not recorded as forest conversion. Roads are a useful proxy indicator of habitat fragmentation and degradation. The world's expanding road network is opening up remote forests to logging, mining, and pioneer settlement. Roads also increase hunting and poaching. The area burned by natural forest fires is now insignificant in comparison with human-initiated fires. Tropical forest fires have increased in area and intensity in recent years, because of drought, clearance for agriculture, and land tenure disputes.


Decreased
fruiting of trees
Tree die-off
Bird populations
decline
Water stress
Reduced water quality
from increased runoff




sun
air
water
soil
producer
consumers
predators

CONCLUSION

Yet continuing forest loss worldwide negatively impacts the livelihoods of millions of people and poses major challenges to sustainable development, in part because these forest ecosystem services continue to be undervalued, or not valued at all. Humans are both ecological participants and ecosystem swindlers. As a result, we are both reliant on and accountable for the environmental quality of the ecosystems in which we live. Fortunately, the global community appears to be arriving at an important turning point, with a number of recent developments pointing to a positive trajectory of progress—including various commitments and agreements made in recent years such as the New York Declaration on Forests (NYDF), the Paris Agreement, the 2030 Agenda for Sustainable Development and its Sustainable Development Goals (SDGs), and the UN Strategic Plan for Forests 2017-2030 (UNSPF) and its Global Forest Goals (GFGs). Existing international guidance documents such as the UN Forest Instrument and the UN Strategic Plan for Forests provide a framework for national actions and international cooperation to sustainably manage forests, and should continue to be promoted as tools to support countries' efforts at integrating forest ecosystem services into all aspects of national policy making and planning.

Partly in response to these global policy signals and developments, governments are beginning to integrate consideration of forest ecosystem services into their development policies and plans. However, these efforts are just beginning and much progress is yet to be made. At the same time, investments in forest conservation and forest ecosystem service provision are also growing, with finance coming from public and private sources. Ultimately, countries must establish regulations and incentives which properly acknowledge and account for the values provided by forest ecosystems to society, and which direct sufficient finance to safeguard these services over the long-term for sustainable development.

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20/6/2022

TUTORIAL

ON

ECOSYSTEM OF POND

Submitted By

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College Roll No:-21/BSCH/0176

Subject: Psychology

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I would like to express my special thanks of gratitude to my teacher, Namrata Basu, who gave me the golden opportunity to do this wonderful project on "STUDY OF ECOSYSTEM-POND", which also helped me in doing a lot of Research and I came to know about so many new things. I am really thankful to her.

Any attempt at any level can't be satisfactorily complete without the support and guidance of my parents and friends. I would like to thank my parents who helped me a lot in gathering different information, collecting data and guiding me from time to time in making this project, despite of their busy schedules, they gave different ideas in making this project unique.

INTRODUCTION

Ecosystem of Ponds

An ecosystem is a dynamic complex of plant, animal, and microorganism communities and the nonliving environment, interacting as a functional unit. Remember that the organisms living in an ecosystem are broken down into categories: producers, consumers, and decomposers. A pond is a quiet body of water that is too small for wave action and too shallow for major temperature differences from top to bottom. It usually has a muddy or silty bottom with aquatic plants around the edges and throughout. However, it is often difficult to classify the differences between a pond and a lake, since the two terms are artificial and the ecosystems really exist on a continuum. Generally, in a pond, the temperature changes with the air temperature and is relatively uniform. Lakes are similar to ponds, but because they are larger, temperature layering or stratification takes place in summer and winter, and these layers turnover in spring and fall. Ponds get their energy from the sun. As with other ecosystems, plants are the primary producers. The chlorophyll in aquatic plants captures energy from the sun to convert carbon dioxide and water to organic compounds and oxygen through the process of photosynthesis. Nitrogen and phosphorus are important nutrients for plants. The addition of these substances may increase primary productivity. However, too many nutrients can cause algal blooms, leading to eutrophication.

DISCUSSION

An **ecosystem** is a community of living organisms (plants, animals and microbes) in conjunction with the nonliving components of their environment (things like air, water and mineral soil), interacting as a system.

These biotic and abiotic components are regarded as linked together through nutrient cycles and energy flows.

As ecosystems are defined by the network of interactions among organisms, and between organisms and their environment, they can be of any size but usually encompass specific, limited spaces (although some scientists say that the entire planet is an ecosystem).

Energy, water, nitrogen and soil minerals are other essential abiotic components of an ecosystem. The energy that flows through ecosystems is obtained primarily from the sun. It generally enters the system through photosynthesis, a process that also captures carbonfrom the atmosphere.

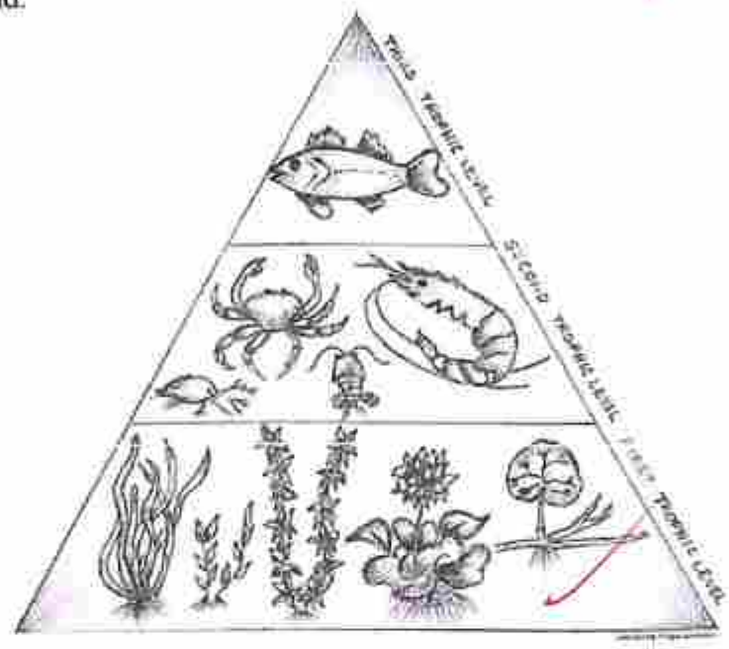
By feeding on plants and on one another, animals play an important role in the movement of matter and energy through the system.
They also influence the quantity of plant and microbial biomass present. By breaking down dead organic matter,decomposers release carbon back to the atmosphere and facilitate nutrient cycling by converting nutrients stored in dead biomass back to a form that can be readily used by plants and other microbes.

Ecosystems are controlled both by external and internal factors. External factors such as climate, the parent material which forms the soil and topography, control the overall structure of an ecosystem and the way things work within it, but are not themselves influenced by the ecosystem.

Ecosystem Types -

- Aquatic ecosystem
  - Marine ecosystem
    - Large marine ecosystem
  - Freshwater ecosystem
    - Lake ecosystem
    - River ecosystem
    - Wetland
- Terrestrial ecosystem
  - Forest
  - Littoral zone
  - Riparian zone
  - Subsurface lithoautotrophic microbial ecosystem
  - Urban ecosystem
  - Desert

A pond is different from a river. Rivers are generally fast flowing. Ponds are hollows with water in them. The is very little water flow in a pond. In this still water a whole community of plants and animals can grow. The pond at Roe Valley Country Park has been there for a very long time. Old maps as far back as 1782 show the pond. It is thought to have been a quarry from which the stones to build Limavady town were taken. By the year 2000 the pond had been neglected for a long time. It had become completely choked with dead leaves.
The pond was cleaned out. Water plants were replanted and wildlife encouraged to develop in the pond.



Habitat and Biodiversity
At one time there were many more ponds than we have today. Farmers needed ponds for their cattle. They now have piped water. Ponds were also needed to make linen. These ponds have disappeared. This has reduced the habitat available to wildlife. This means that many pond creatures become rarer. The word for the variety of life is biodiversity. Our native biodiversity is being reduced due to the lack of pond habitat.
Safety
Ponds are very interesting places to study. They are also very dangerous. Steep sides and mud at the bottom can make even the shallowest water very dangerous. Your visit to the pond will have been very carefully supervised. The next few pages will look at some of the things you studied on your visit to the park.

POND PLANTS
The picture above shows many of the plants you would expect to find in a pond. The pond at Roe Valley Country Park does not have all these plants because the pond was scrapped out some years ago. Plants were introduced but not all of them have grown successfully.
Photosynthesis
Plants are different to animals. Plants can make their own food. They do this by using water, minerals and carbon dioxide to absorb the sun's rays. This is called photosynthesis. Plants are essential for all life on earth. They absorb carbon dioxide and produce oxygen which allows animals to breath. They also provide food for animals to eat. This is true for all ecosystems be it on land or water. A simple way to understand this is to think of a food

chain: sun, grass, rabbit and fox. Food chains also exist in ponds and all of them depend upon plants.

Plankton and Algae

The smallest plants in ponds are plankton. These are so tiny that they cannot be seen except with a microscope. They provide for many of the smaller creatures in the pond. Another small plant is algae. This can sometimes be seen floating on ponds as what looks like a green scum. Algae can become a problem in some ponds. Farmers use chemicals called nitrates and phosphates as fertiliser.

If too much of these wash into ponds they can cause an increase in algae growth. You can sometimes see this as a carpet of green covering the whole pond. The algae use up all the oxygen in the pond killing off all life in the pond. Pond life can also be destroyed by bacteria. Sometimes a pond can be filled with leaves. Bacteria, which rot the leaves, use up all the oxygen in the pond. This kills off any other life in the pond.

Plant Succession

If you look at the pond you will see that some plants live entirely outside the water and some live entirely in it. Others are partially in the water. Flowers like forget-me-nots and marsh marigolds live in the wet ground around the pond. Reeds have there roots in the pond but most of the plant is above the water. Water lilies float in the pond and are attached to the bottom by long stems. You will also see Canadian pond weed which is completely submerged under the water. Each of these plants need special adaptations to survive where they grow.

POND CREATURES

You will have found many strange looking creatures in the pond. Because they all live in water they are different from land based animals. They are adapted for living in or on water. This means have things on their bodies which allow them to live successfully in this environment.

Snail

You will find many snails in the pond. They can vary from 25mm to 50 mm in size. Like all snails they have a hard shell. They are molluscs and are closely related to their land cousins. There are many different kinds of snail to be found in the pond. The water snail floats about. It has gills which allow it to breath under water. The pond snail and the ramshorn snail cannot breath under water. They hold air in their shells and must come to the surface when their air runs out. All the snails eat algae.

Water Spider

Water spiders can be about 16mm. They are arachnids. They cannot breath under water. They spin a web and use it as an air bell. They are able to breath in this air bell. They spend most of their time in this air bell only coming out to catch the small creatures they eat. You will catch lots of spiders but not all of them will be water spiders. Some of the spiders you catch will simply be hiding in the plants above the water.

Shrimp

The shrimp is about 16mm long. They have 7 or 9 pairs of legs. They swim on their sides. The shrimp is a crustacean related to crabs, lobsters and woodlice. It breathes using gills. Shrimps eat floating dead matter in the pond. They will not live in polluted water. Their presence means that the pond is not polluted.

Caddis Fly Larva

You will have found various kinds of caddis fly larva cases. They are about 20mm long. They can be made from plants, stones or shells. The caddis fly is moth like fly. Like many insects it has a life cycle of egg, larva, pupa and adult. The adult caddis fly lays its eggs in water. The larva stage makes it own case from silk like material surrounding this inner case with

different material. The pupa stage also remains in the case. Eventually the adult fly emerges and begins its short life as a fly.

Beetle Larva

Many insects have part of there life cycle in water. Dragonflies, damsel flies, caddis flies and mayflies all leave the water at the adult stage. Others remain in the water only occasionally flying.

Their larva stage lives in the water feeding on smaller creatures. You will find various kinds of larva in the water. The one shown here is the larva of the great diving beetle. It is the largest larva

in the pond about 50 mm when fully grown. It is fierce predator eating whatever it can catch.

Pond Skater

Pond skaters are the first creatures you will notice on the water. They are about 20mm across. You will be able to tell immediately that they are insects as they have 6 legs. These are held out from the body so it can spread its weight as widely as possible. This allows it to move across the surface very quickly allowing it to catch its prey, the small creatures which live on the surface. Some species of pond skater can fly others cannot.

Whirligig Beetle

In spring time and early summer the whirligig beetle is very obvious on the surface of the water. You will see large numbers of them whirling about in the manner that gives them their name. They are small beetles about 15mm long. They whirl about on the surface to disturb the small creatures they eat.

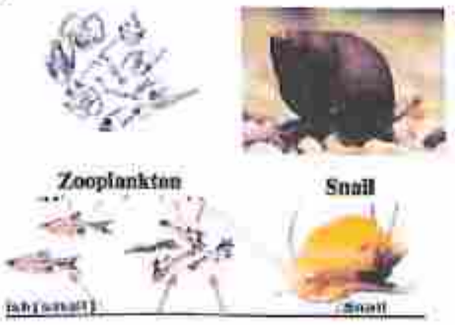
Food Chains and Ecology of the Pond

The picture above illustrates some of the life in the pond. All life in the pond depends upon the ability of the plants to photosynthesise. The animals are then able to feed from the plants. You will be familiar with the idea of a food chain. One simple food chain might be: Sun- algae- tadpole- kingfisher.

To this we could add the water boatman which eats dead material at the bottom of the pond. There will be many others you could think of. All these food chains added together form an interconnected web that make up the pond ecosystem. The idea of an ecosystem means that all the living things in the pond depend upon one another. We have seen that ponds are very susceptible to pollution. This can destroy the pond ecosystem. Ponds are very important for wildlife of all sorts, biodiversity. It is important that we conserve them.

Following are the consumers of the pond habitat food chain:

Primary Consumers are the herbivores that depend on the producers for food - examples are tadpoles , snails, very tiny fish



Secondary Consumers are the organisms which depend on the primary consumers for food- examples are medium sized fish, frogs

Tertiary Consumers are the organisms which can feed on the primary and the secondary consumer –examples are the duck, crane

Top Consumers or the predators, which include the osprey, fish hawk, and humans.

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STUDY OF ECOSYSTEM-FOREST

SUBMITTED BY JOYITA DAS

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COLLEGE ROLL NO-21/BSCH/0177

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PAPER CODE- AECC 2

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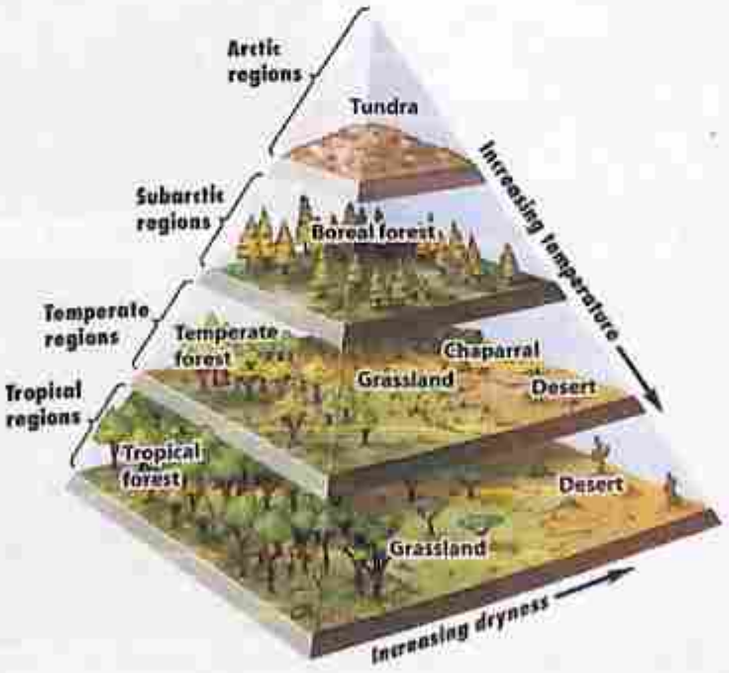
INTRODUCTION

An ecosystem is a consists of all the organisms and the physical environment with which they interact. Ecosystems form the foundation of Biospheres and determine the life of organisms, everywhere on planet earth. In an ecosystem, each and every single organism plays its part in the cyclic interaction, of living things with their surrounding environments. Living organisms depend on other non-living factors for their survival and the absence of one can affect all the organisms in an ecosystem. Human beings are also very much dependent on an ecosystem for their survival. The benefits ecosystems provide us with are countless which include food, water, soil formation, pollination, and air purification. A forest ecosystem is a unique ecology, including a very nice community of flora and fauna. When we heard "forest," the primary thing that comes to our mind is trees. An area covered with trees making various canopy layers is commonly known as a forest ecosystem. A natural woodland area making it a suitable place for the survival of biotic and abiotic components, is usually termed as a forest ecosystem. A forest ecosystem consists of various plants, animals, and other microorganisms, making it a natural habitat for them. It helps to balance the climate of the planet. One of the major plays roles that forest plays is that it provides us oxygen to breathe. Trees help to maintain the balance of carbon dioxide in the atmosphere. Besides this, forests also help to prevent soil erosion, rainfall, purifying the air, etc.



DISCUSSION

A forest ecosystem is an ecosystem of forests and resources. Forests are renewable natural resources. Forests are renewable natural resources. Forests are formed by a community of plants that are predominantly structurally defined by their trees, shrubs, herbs, climbers, and ground cover. Soil, animals, insects, microorganisms, and birds are the most important interacting units of a forest ecosystem. In India, the forests occupy about 18-20% of the total land area.

1. **Abiotic Components** of the forest include inorganic and organic components present in the soil along with temperature, rainfall, light, etc.
2. **Biotic Components**are represented by producers, consumers and decomposers.

COMPONENTS

1. Producers- It can synthesise their own food by the photosynthesis process. All green plants are considered producers of the ecosystem as they convert sunlight into the chemical energy of food.
2. Primary Consumers- Since the consumers cannot prepare their own food, they depend on producers. Herbivorous animals get their food by eating the producers directly.

3. Secondary Consumers- It draw their food from primary consumers.

4. Decomposers- The decomposers of the forest ecosystem break down dead plants and animals, returning the nutrients to the soil so that they can be used by the producers. Apart from bacteria, ants, and termites are important decomposers in the amazon rainforest.
5. Nutrient Cycle- The nutrient cycle is cyclic. For the proper functioning of ecosystems, nutrients are required. Carbon, hydrogen, oxygen, and nitrogen constitute about 95% of the mass of the living organisms.

6. Energy Flow- In a forest ecosystem, the grass, which draws its nutrition from sun, soil, and water, eaten by the frogs, snakes and vultures in succession. In this process of eating and being eaten, nutrients are passed from one step to the next in a food chain.

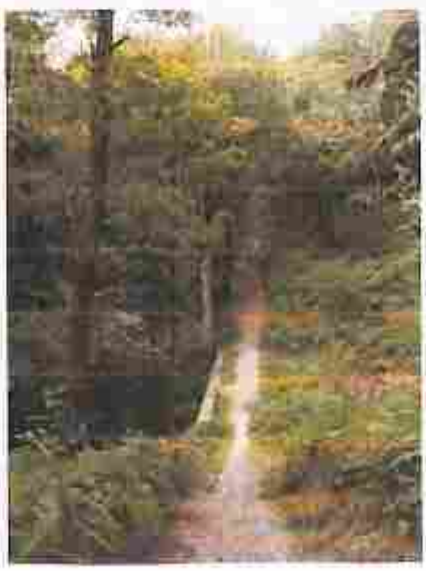
CHARACTERISTICS

- Forests are characterised by warm temperature, and adequate rainfall, which make the generation of a number of ponds, lakes etc.,
- The forest supports many wild animals and protects biodiversity.
- The soil is rich in organic matter and nutrients, which support the growth of trees.
- The forest maintains the climate and rainfall.

TYPES

There are a few types of forest ecosystems listed below:

- Tropical Evergreen Rainforest- Only a small percentage of tropical forests are rainforests where average rainfall is 80-400inches in a year.
- Tropical Deciduous Rainforest- The main characteristics of tropical deciduous rainforest are broad-leaved trees along with dense bushes, shrubs, etc. Two main seasons -summer and winter are distinctly visible there.
- Temperate Evergreen Forest- Temperature evergreen forest is a type of forest that is characterised by smaller number of trees but an adequate number of ferns and mosses.
- Temperature Deciduous Forest- Temperature deciduous forest evolves in the most temperate region with sufficient rainfall.
- Taiga- Situated just south of the tundra, Taiga is characterised by evergreen conifers. The average temperature is below the freezing point for almost half of the year.



CONCLUSION

FORESTS ECOSYSTEM helps in the preventing global warming. The water in the soil is absorbed by plants through roots. They release excess into the atmosphere, which helps in the occurrence of rainfall. Forests ecosystems prevent soil erosion and maintain the fertility of the soil. For protecting the huge variety of species(biodiversity)to maintain natural beauty some wildlife is necessary for the survival of the animals. We depend upon the wildlife for food, clothing, medicines, and many other products. We also use wildlife for research work.

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AD
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COLLEGE NAME – GOKHALE MEMORIAL GIRLS' COLLEGE

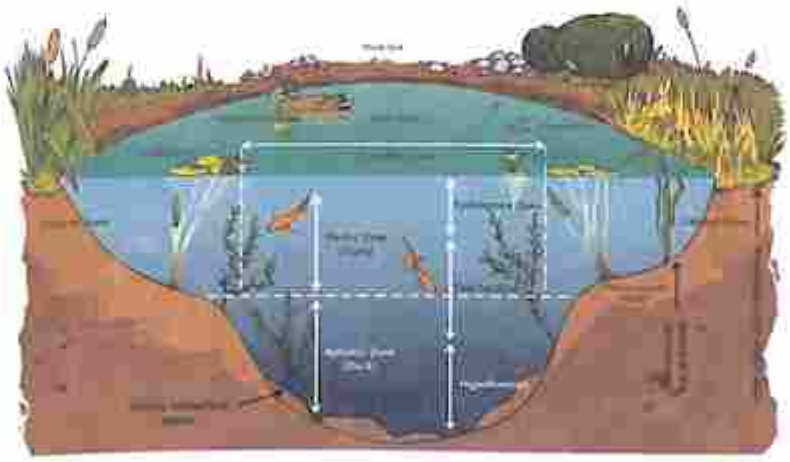
TOPIC

STUDY OF ECOSYSTEM

WETLAND ECOSYSTEM

INDEX

INTRODUCTION –



A PICTORIAL OF ECOSYSTEM (Copyright – twinkl)

An ecosystem is a geographic area where plants, animals and other organisms, as well as weather and landscape, work together to form a bubble of life. Ecosystems contain biotic or living parts as well as abiotic factors or non-living parts.

WETLAND ECOSYSTEM –

A WETLAND IN CENTRAL FLORIDA (Copyright – shutterstock.com)

A **wetland** is a distinct ecosystem that is flooded by water, either permanently (for years or decades) or seasonally (for weeks or months). Flooding results in oxygen-free (anoxic) processes prevailing, especially in the soils.[1] The primary factor that distinguishes wetlands from terrestrial land forms or water bodies is the characteristic vegetation of aquatic plants,

adapted to the unique anoxic hydric soils.[2] Wetlands are considered among the most biologically diverse of all ecosystems, serving as home to a wide range of plant and animal species.

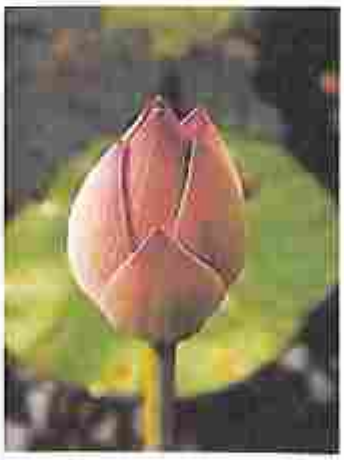
PROCESSES OF DEVELOPING WETLAND - Wetlands vary widely due to local and regional differences in topography, hydrology, vegetation, and other factors, including human involvement.

The most important factor producing wetlands is flooding. The duration of flooding or prolonged soil saturation by groundwater determines whether the resulting wetland has aquatic, marsh or swamp vegetation. Other important factors include fertility, natural disturbance, competition, herbivory, burial and salinity. When peat accumulates, bogs and fens arise.

Biota

The biota of a wetland system includes its flora and fauna as described below. The most important factor affecting the biota is the duration of flooding.[1] Other important factors include fertility and salinity. In fens, species are highly dependent on water chemistry. The chemistry of water flowing into wetlands depends on the source of water and the geological material in which it flows through as well as the nutrients discharged from organic matter in the soils and plants at higher elevations in slope wetlands. Biota may vary within a wetland due to season or recent flood regimes.

Flora



Bud of *Nelumbo nucifera*, an aquatic plant (Copyright – Wikipedia)

There are four main groups of hydrophytes that are found in wetland systems throughout the world.

Submerged wetland vegetation can grow in saline and fresh-water conditions. Some species have underwater flowers, while others have long stems to allow the flowers to reach the surface. Submerged species provide a food source for native fauna, habitat for invertebrates, and also possess filtration capabilities. Examples include seagrasses and eelgrass.

Floating water plants or floating vegetation are usually small, like those in the Lemnoideae subfamily. Emergent vegetation like the arrow arum (*Peltandra virginica*) rise above the surface of the water.

Trees and shrubs, where they comprise much of the cover in saturated soils, qualify those areas in most cases as swamps. The upland boundary of swamps is determined partly by water levels. This can be affected by dams Some swamps can be dominated by a single species, such as silver maple swamps around the Great Lakes. Others, like those of the Amazon basin, have large numbers of different tree species. Examples include cypress (*Taxodium*) and mangrove.

Fauna

Many species of frogs live in wetlands, while others visit them each year to lay eggs. (Copyright-Wikipedia)

Snapping turtles are one of the many kinds of turtles found in wetlands. (Copyright – Wikipedia)

Fish are more dependent on wetland ecosystems than any other type of habitat. Seventy-five percent of the United States' commercial fish and shellfish stocks depend solely on estuaries to survive. Tropical fish species need mangroves for critical hatchery and nursery grounds and the coral reef system for food.

Amphibians such as frogs need both terrestrial and aquatic habitats in which to reproduce and feed. While tadpoles control algal populations, adult frogs forage on insects. Frogs are used as an indicator of ecosystem health due to their thin skin which absorbs both nutrient and toxins from the surrounding environment resulting in an above average extinction rate in unfavorable and polluted environmental conditions.

Reptiles such as alligators and crocodiles are common in wetlands of some regions. Alligators occur in fresh water along with the fresh water species of the crocodile. The Florida Everglades is the only place in the world where both crocodiles and alligators coexist. The saltwater

crocodile inhabits estuaries and mangroves and can be seen in the coastline bordering the Great Barrier Reef in Australia. Snapping turtles are one of the many kinds of turtles found in wetlands.

Birds, particularly waterfowl and wading birds, use wetlands extensively.

Mammals include numerous small and medium-sized species such as voles, bats, and platypus in addition to large herbivorous and apex species such as the beaver, coypu, swamp rabbit, Florida panther, and moose. Wetlands attract many mammals due to abundant seeds, berries, and other vegetation components, as well as abundant populations of prey such as invertebrates, small reptiles and amphibians.

Algae

Algae are diverse plant-like organisms that can vary in size, color, and shape. Algae occur naturally in habitats such as inland lakes, inter-tidal zones, and damp soil and provide a dedicated food source for many animals, including some invertebrates, fish, turtles, and frogs. There are three main groups of algae:

- Plankton are algae which are microscopic, free-floating algae. This algae is so tiny that on average, if 50 of these microscopic algae were lined up end-to-end, it would only measure one millimetre. Plankton are the basis of the food web and are responsible for primary production in the ocean using photosynthesis to make food.
- Filamentous algae are long strands of algae cells that form floating mats.
- *Chara* and *Nitella* algae are upright algae that look like a submerged plant with roots.

IMPOTANCE OF WETLAND ECOSYSTEM -

PICTORIAL OF IMPOTANCE OF WETLANDS (Copyright – pinterest.com)

Wetland systems directly and indirectly support lakhs of people, providing goods and services to them. They help check floods, prevent coastal erosion and mitigate the effects of natural disasters like cyclones and tidal waves. They store water for long periods.
Their capacity during heavy rainfall to retain excess floodwater that would otherwise cause flooding results in maintaining a constant flow regime downstream, preserving water quality and increasing biological productivity for both aquatic life as well as human communities of the

region. Inundated wetlands are very effective in storing rainwater and are the primary source for recharging ground water aquifers.

Many wading birds and waterfowl like egrets, herons and cranes nest in wetlands. Wetlands also provide food and shelter for mammals. They act as natural filters and help remove a wide range of pollutants from water, including harmful viruses from sewage and heavy metals from industries.

Wetlands retain nutrients by storing eutrophic parameters like nitrogen and phosphorus and accumulating them in the sub-soil, thereby decreasing the potential for eutrophication.

Mangrove forests are valued for production of fish and shell-fish, live-stock fodder, fuel and building materials, local medicine, honey and bees-wax and for extracting chemicals used in tanning leather, farming and fisheries production have replaced many mangrove areas.

Moreover, significant socio-economic values like constant water supply, fisheries, fuelwood, medicinal plants, livestock grazing, agriculture, energy resource, wildlife resource, transport, recreation and tourism are noteworthy.

THREATS TO WETLAND ECOSYSTEM - The Wildlife Institute of India's survey reveals that 70-80% of individual freshwater marshes and lakes in the Gangetic flood plains have been lost in the last five decades. At present, only 50 percent of India's wetlands remain. They are disappearing at a rate of 2% to 3% every year. Indian mangrove areas have been halved almost from 700,000 hectares in 1987 to 453,000 hectares in 1995 (Sustainable Wetlands, Environmental Governance-2, 1999). A recent estimate based on remote sensing shows only 4000 sq. km area of mangrove resource in India.

The loss of wetlands leads to environmental and ecological problems, which have a direct impact on the socio-economic benefits of the associated populace. Serious consequences, including increased flooding, species decline, deformity, or extinction and decline in water quality could result. Wetlands are also important as a genetic reservoir for various species of plants including rice, which is a staple food for 3/4th of the world's population.

Urbanization

Wetlands near urban centres are under increasing developmental pressure for residential, industrial and commercial facilities. Urban wetlands are essential for preserving public water supplies.

Effects of Urbanization on Wetland Ecosystem (Copyright - storymaps.arcgis.com)

Anthropogenic activities	Due to unplanned urban and agricultural development, industries, road construction, impoundment, resource extraction and dredge disposal, wetlands have been drained and transformed, causing substantial economic and ecological losses in the long term.
Agricultural activities	Following the Green Revolution of the 1970s, vast stretches of wetlands have been converted to paddy fields. Construction of a large number of reservoirs, canals and dams to provide for irrigation significantly altered the hydrology of the associated wetlands.

Effects of Agricultural Activities on Wetland Ecosystem (Copyright-worldatlas.com)

Hydrologic activities	Construction of canals and diversion of streams and rivers to transport water to lower arid regions for irrigation has altered the drainage pattern and significantly degraded the wetlands of the region.
Deforestation	Removal of vegetation in the catchment leads to soil erosion and siltation

Pollution	Unrestricted dumping of sewage and toxic chemicals from industries has polluted many freshwater wetlands.

Effects of Pollution on Wetland Ecosystem (Copyright – worldatlas.com)

Salinization	Over withdrawal of groundwater has led to salinization
Aquaculture	Demand for shrimps and fishes has provided economic incentives to convert wetlands and mangrove forests to develop pisciculture and aquaculture ponds.
Introduced species	Indian wetlands are threatened by exotic introduced plant species such as water hyacinth and salvinia. They clog waterways and compete with native vegetation.
Climate Change	Increased air temperature; shifts in precipitation; increased frequency of storms, droughts, and floods; increased atmospheric carbon dioxide concentration; and sea level rise could also affect wetlands.

CONSERVATION - Wetlands have historically been the victim of large draining efforts for real estate development, or flooding for use as recreational lakes or hydropower generation. Some of the world's most important agricultural areas are wetlands that have been converted to farmland. Since the 1970s, more focus has been put on preserving wetlands for their natural function yet by 1993 half the world's wetlands had been drained.

In order to maintain wetlands and sustain their functions, alterations and disturbances that are outside the normal range of variation should be minimized.

A Protected Wetland in Estonia (Copyright – Wikipedia)

Wetlands are vital ecosystems that provide livelihoods for the millions of people who live in and around them. The Millennium Development Goals (MDGs) called for different sectors to join forces to secure wetland environments in the context of sustainable development and improving human wellbeing. Studies have shown that it is possible to conserve wetlands while improving the livelihoods of people living among them. Case studies conducted in Malawi and Zambia looked at how dambos – wet, grassy valleys or depressions where water seeps to the surface – can be farmed sustainably to improve livelihoods. Project outcomes included a high yield of crops, development of sustainable farming techniques, and adequate water management generating enough water for use as irrigation.

Ramsar Convention

The Convention on Wetlands of International Importance, especially as Waterfowl Habitat, or Ramsar Convention, is an international treaty designed to address global concerns regarding wetland loss and degradation. The primary purposes of the treaty are to list wetlands of international importance and to promote their wise use, with the ultimate goal of preserving the world's wetlands. Methods include restricting access to the majority portion of wetland areas, as well as educating the public to combat the misconception that wetlands are wastelands. The Convention works closely with five International Organization Partners. These are: Birdlife International, the IUCN, the International Water Management Institute, Wetlands International and the World Wide Fund for Nature. The partners provide technical expertise, help conduct or facilitate field studies and provide financial support. The IOPs also participate regularly as observers in all meetings of the Conference of the Parties and the Standing Committee and as full members of the Scientific and Technical Review Panel.

CONCLUSION - Wetland ecosystems are interconnected and interactive within a watershed. In India, unplanned urbanization and a growing population have taken their toll on wetlands. To counter these, management of wetlands has to be an integrated approach in terms of planning, execution and monitoring. Effective tie-ups of trained academicians and professionals, including ecologists, hydrologists, economists, watershed management specialists, planners and decision makers must be linked with local expertise for overall management of

wetlands. All these would increase knowledge and understanding of wetlands and evolve more comprehensive and long-term conservation and management strategies. Spreading awareness by initiating educational programs about the importance of wetlands in local schools, colleges and among the general public in the vicinity of the water bodies, besides constant monitoring of wetlands for their water quality, would provide vital inputs to safeguard the wetlands from further deterioration.

Source: CPR Environmental Education Centre, Chennai

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INDEX

Topic: Visit to a locally polluted urban area.

INTRODUCTION: The concept of urban pollution refers to the presence or introduction in cities and urban areas of poisonous or harmful substances. Urban pollution may come from natural sources but the most detrimental are those emissions related to human activities. The anthropogenic sources of pollution such as factories, industries,transportation and so on are typically exacerbated in cities due to the local concentration of humans and human activities. For instance pollution in cities affected by global environmental threads, such as global warming and by locally originated environmental challenges such as waste management, recycling and light and noise generation.

Causes of pollution in this urban area:
Emissions from transportation vehicles are a major source of pollution in this area. They are major sources of both local urban pollutants, such as oxides of nitrogen, hydrocarbons and carbon monoxide and global greenhouse emission like carbon dioxide. Excessive vehicle use creates not only emission of pollution but also problem of sound pollution.
There are a few small scale industries and factories in this area that don't have enough capital and rely on government grants to run their day to day business often escape environment regulations and release a large number of toxic gases in the atmosphere.
Dumping of sewage in ponds has led to water pollution in this area.

In particular excessive air pollution has caused cardiovascular problems of people living in this area such as asthma, respiratory problems, lungs and heart diseases. Air pollution can also cause long term damage to people's nerves, brain, kidneys, liver and other organs. Unfortunately contamination of water bodies has led to depletion of drinking water supplies. The water bodies should be kept clean in order to prevent outbreak of bacteria and viruses. Due to excessive sound pollution produced by running vehicles, it becomes difficult to concentrate on daily activities.

Ways to reduce pollution:

Energy should be conserved at home, at work, everywhere. Walk,bike or public transportation should be used more. Afforestation that is planting of trees should be encouraged and promoted. There should be proper waste disposal system in order to prevent contamination of water bodies.

Conclusion: In a nutshell every kind of pollution leaves a huge negative impact on our environment, human lives, animals etc. We, as responsible citizens must take steps towards a better tomorrow. We must join hands to take various initiatives and fight against this problem. A lot of innocent lives are put in danger due to pollution every day. Perhaps one should take a holistic view of nature- it is not an entity that exists seperately from us; the nature is us, we are inalienable part of it, and we should care for it in the most appropriate manner.

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Bibliography: Sources have been taken from- local people, teacher in charge and local newspapers.

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