



## Skill Hub

### AZOLLA FARMING

Azolla is a nature's gift for rice cultivation and has tremendous other agricultural uses. It is one of the most nutritive animal feed and also a source of green manure. Moreover it is also an excellent bio fertilizer too.

Azolla has several times higher level of crude protein than other forage crops and is also rich in mineral nutrients. Despite its benefits this commonly available water fern is in disguise due to lack of knowledge among farming community.

Azolla is a floating aquatic pteridophyte (a fern) with symbiotically associated nitrogen fixing cyanobacteria (*Anabaena azollae*). In fact it often forms green or red mats in water bodies and also has names as 'duckweed' and 'fairy moss'

Six species of Azolla are there via:- *A. Carolina*, *A. filiculoides*, *A. Mexicana*, *A. microphylla*, *A. nilotica* and *A. pinnata*. Out of these *Azolla pinnata* is very common and good yielder in tropical climates.

The plants are visible as clusters of small leaf floating in ponds, wet fields, rice field and drains. While their fibrous roots floats underneath of the water.





## Uses of Azolla

### GREEN MANURE

Use of Azolla as green manure

Azolla can be used to increase rice yield by several folds at comparatively low cost and less labour. They are grown in a part of field and are transferred in the whole field, before or after transplanting.



### FISH MANURE

It is highly nutritious and cheap source of fish feed with high protein content. The green plants are grown in a section of pond by separating with a net from fishes. Afterwards they are released at intervals for this fishes to eat.

### PIGGERY AND POULTRY SUPPLEMENT

Being a rich source of proteins and amino acids they are often used as a feed supplement. However it is not only limited to poultry and pigs this feed is used for other livestock also.

### DAIRY FEED

Mixing some amount of dairy feed with Azolla enriches the nutritional value of feed. Moreover direct feeding of livestock with green Azolla in dry seasons is also a good practice.

### BIOFERTILIZER

Being capable of symbiotic nitrogen fixation Azolla is an excellent bio fertilizer. In fact in different researches it was found that the yield of rice was increased by 20-30% when incorporated with Azolla cultivation.

## VERMICOMPOST PREPARATION

**“VERMICOMPOST IS THE SCIENTIFIC METHOD OF MAKING COMPOST, BY USING EARTHWORMS”**

**PRINCIPLE:** Earthworms are mainly used for vermicomposting preparation as they eat the organic matter and produce castings through their digestive systems.

Vermiculture means “worm –farming”. Earthworms feed on organic waste materials and give out excreta in the form of” vermicasts” that are rich in nitrates and minerals such as phosphorus, magnesium, calcium and potassium. These are used as fertilizer and enhance soil quality.

**PROCEDURE:** To prepare compost, we took a concrete tank. The size of the tank is 4\*2

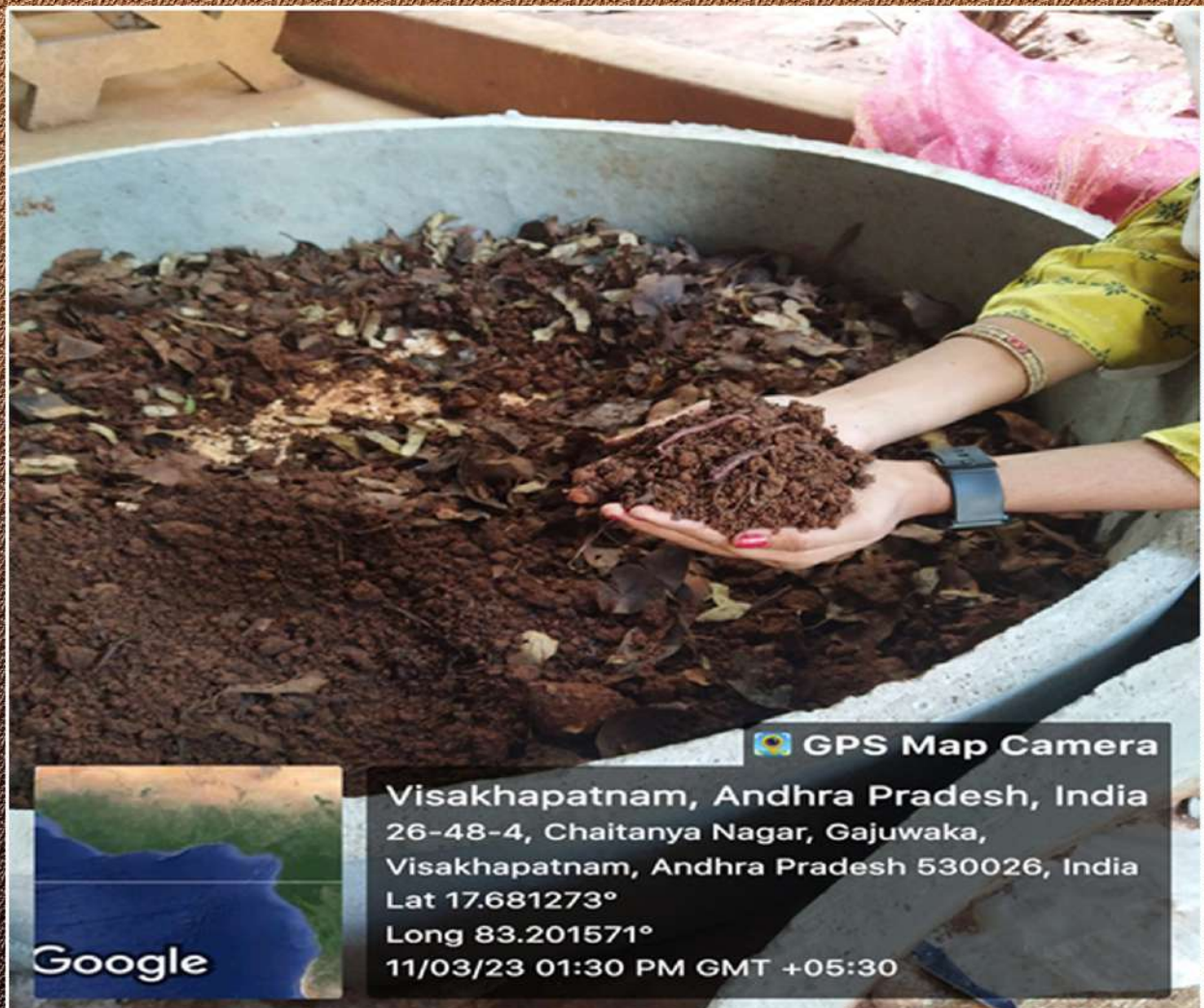
- we collected the organic kitchen waste and allowed it to dry for 2 to 3 days and chopped according to the required size.

- Added a layer of soil or sand at the bottom of the tank.





- THEN ADDED A LAYER OF DRY LEAVES AND AGAIN LAYERED WITH ORGANIC KITCHEN WASTE.
- SPRINKLED IT WITH SLURRY OF COW DUNG.
- THE SAME STEPS WERE REPEATED UNTIL IT WAS ABOUT THE HEIGHT OF 1.0FT.
- ALLOWED IT TO PARTIAL DECOMPOSITION FOR ABOUT 10 DAYS.
- THEN INTRODUCED THE EARTHWORMS.
- AND COVERED THE COMPOST MIXTURE WITH DRY STRAW OR GUNNY BAGS.
- SPRINKLED WATER ON A REGULAR BASIS TO MAINTAIN PROPER MOISTURE AND TEMPERATURE.





 **GPS Map Camera**



**Visakhapatnam, Andhra Pradesh, India**

26-48-4, Chaitanya Nagar, Gajuwaka,

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Lat 17.681273°

Long 83.201571°

01/03/23 02:18 PM GMT +05:30

### **ADVANTAGES OF VERMICOMPOSTING:**

- ENHANCES HEALTH OF THE PLANT ROOTS.
- IMPROVES PHYSICAL STRUCTURE OF THE SOIL.
- INCREASES THE SOIL FERTILITY.
- INCREASES THE WATER RESISTANCE OF THE SOIL.
- HELPS IN GERMINATION, PLANT GROWTH, AND CROP YIELD.

**“VERMICOMPOSTING IS AN ECOFRIENDLY PROCESS THAT RECYCLES ORGANIC WASTE INTO COMPOST AND PRODUCES VALUABLE NUTRIENTS TO SOIL.”**



## **MUSHROOM CULTIVATION**

### **MUSHROOM**

The edible fungus is generally known as Mushroom. It is a fleshy, spore bearing fruiting body of a fungus typically produced above ground on soil or on its food source. Like other fungi, it does not contain chlorophyll and has to depend on food prepared by another organism for nutrition. Therefore, it grows on dead organisms or in symbiosis with other organisms.

### **CLASSIFICATION OF MUSHROOM:-**

#### **1. Edible Mushroom:**

- A. Oyster mushroom (*Pleurotus ostreatus*)
- B. Paddy straw mushroom (*Volvariella volvacea*)
- C. White button (*Agricus bisporus*)

#### **2. NON- EDIBLE (TOADSTOOL)**

The poisonous mushroom is known as Toadstool.

- A. Amnita phalloides
- B. Amnita muscaria
- C. Amnita pantherina
- D. Amnita citrina

#### **CULTIVATION PROCESS -:**

There are 6 main steps involves in mushroom cultivation

**1. PHASE I COMPOSTING**– There are two types of compost –

**A. NATURAL COMPOST**– It is made of raw materials like Straw, Horse manure, Poultry manure etc.



**B. SYNTHETIC COMPOST**—It is made of raw materials like bran, straw, urea, calcium ammonium nitrate or ammonium sulphate and gypsum etc.

In phase 1 composting we made compost by mixing and wetting the raw material. Once the material is wet, aerobic fermentation starts as a result of the growth and reproduction of microorganism. Phase 1 composting takes at least 5-18 days to be ready depending on the raw material.





**2. PHASE II COMPOSTING**– The main focus of phase 2 composting is pasteurization and removal of ammonia which is formed during phase 1.

Concentration higher than 0.7 is dangerous to mycelium spawns growth, so this is important to remove ammonia.

125°F to 130°F is the most perfect temperature because de-ammonifying organism grow well in this range. At the end of phase 2 the temperature should be approximately 75°F to 80°F. The nitrogen content should be 2.0 to 2.4 % and moisture content should be 68 to 72%.

**3. SPAWNING**– The process of sowing Mushroom mycelium into the prepared beds is generally known as spawning. We can do spawning in two ways by dispersing the compost on the trays or mixing the grain spawn with compost before filling the trays. Once the spawning is done we cover the trays with newspaper and then sprinkle some water to maintain moisture content.

**4. CASING**– When we mix finely crushed rotten cow dung with garden soil that is called casing soil. In this pH should be on the alkaline side. The casing soil has to be well sterilized and capable to kill the harmful insects, nematodes, pest etc. By treating the soil with Formalin solution or by steaming we can sterilize it. The casing soil requires lots of air. After spreading is done the temperature should be maintained at 25°C for 72 hours.

**5. PINNING**– The pin develops when the CO<sub>2</sub> content of the room is less than 0.08%.

The newly formed mushroom is very small. The timing of introducing fresh air into the room is very important, until the mycelium has begun to show at the surface of the casing. Stop watering the casing when the pin initial starts forming.





## **6. HARVESTING**— We reap the mushroom into” Flushes”

The first flush is reaped in 3 to 5 days and gives the yield of 15 to 20 kg/m<sup>2</sup>. The second flush is reaped in 5 to 7 days and gives the yield of 9 to 11 kg/m<sup>2</sup>, a little less than first flush.

We get about 27 to 35 kg of total yield.



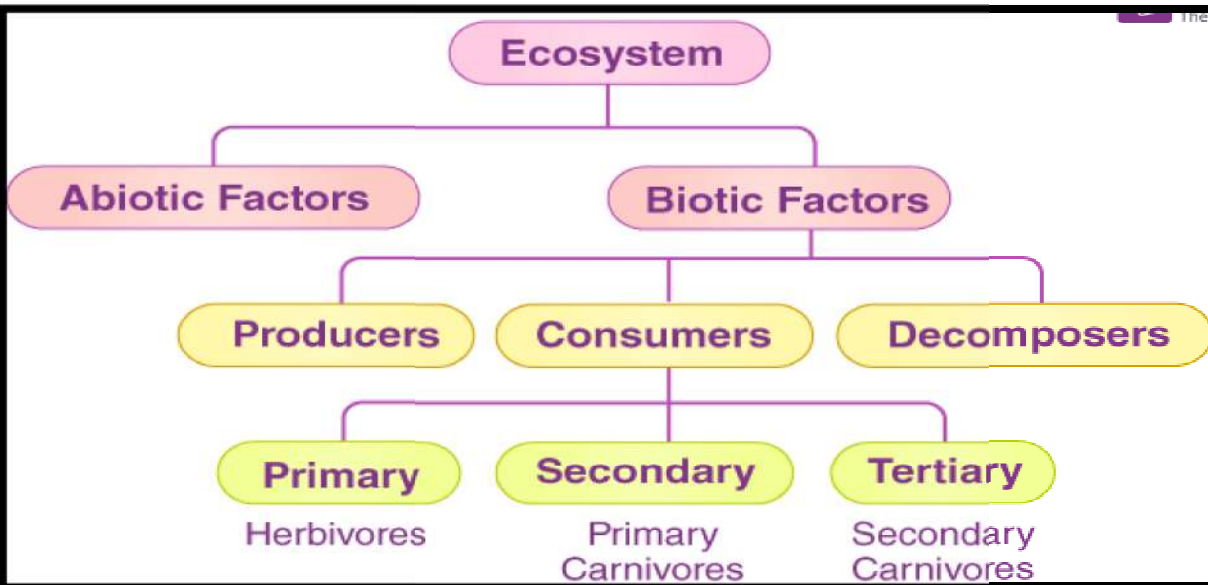
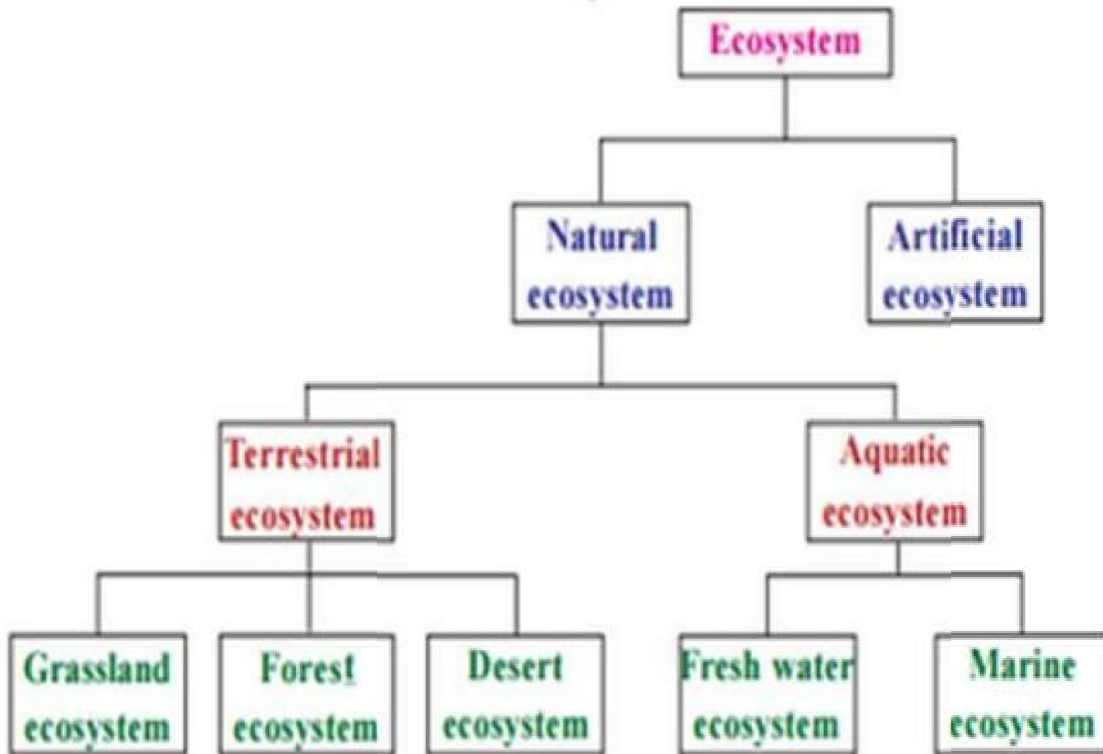
## BENEFITS OF MUSHROOMS

<u>S.NO</u>	<u>NUTRIENT</u>	<u>BENEFITS</u>
<u>1</u>	<u>Selenium</u>	Helps your body make antioxidants to prevent cell damage.
<u>2</u>	<u>Vitamin B6</u>	Supports your nervous system and helps to form red blood cells.
<u>3</u>	<u>Riboflavin, niacin, and pantothenic acid</u>	Help carry out several metabolic reactions and are involved in the production of energy.
<u>4</u>	<u>Zinc</u>	Supports your immune system and healthy growth in babies and children.
<u>5</u>	<u>Potassium</u>	Helps in muscle contraction, assists with fluid balance and maintains normal blood

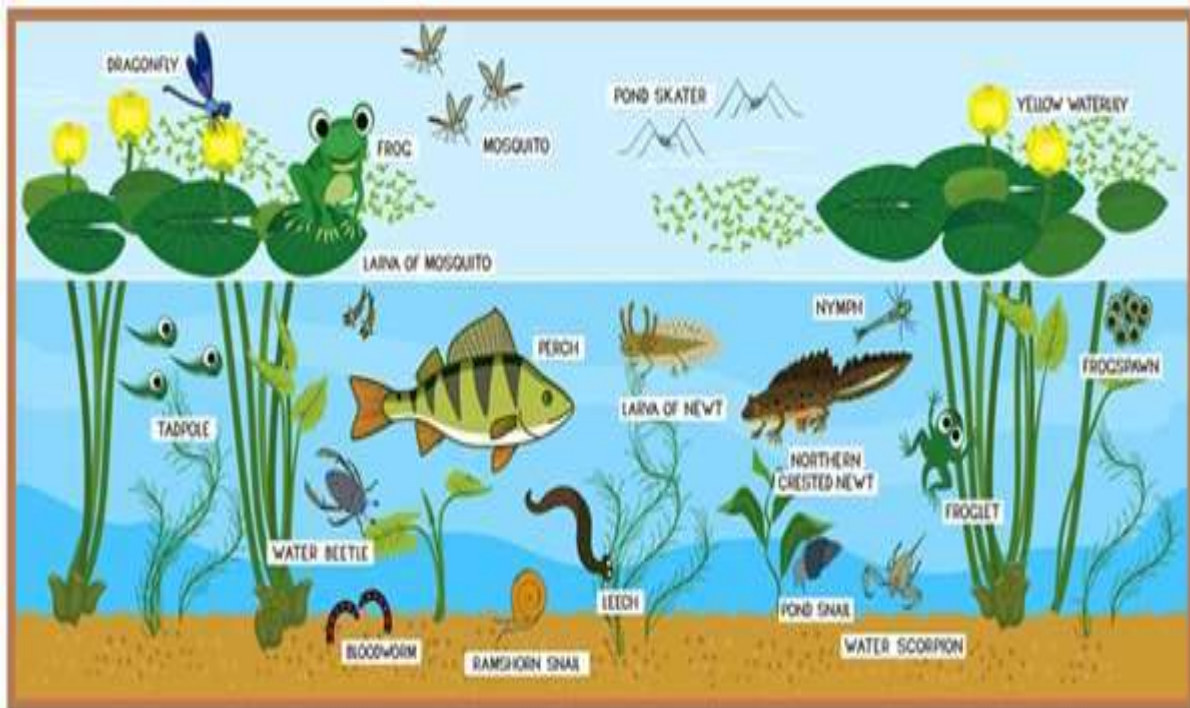
## ECOSYSTEM PROJECT

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.

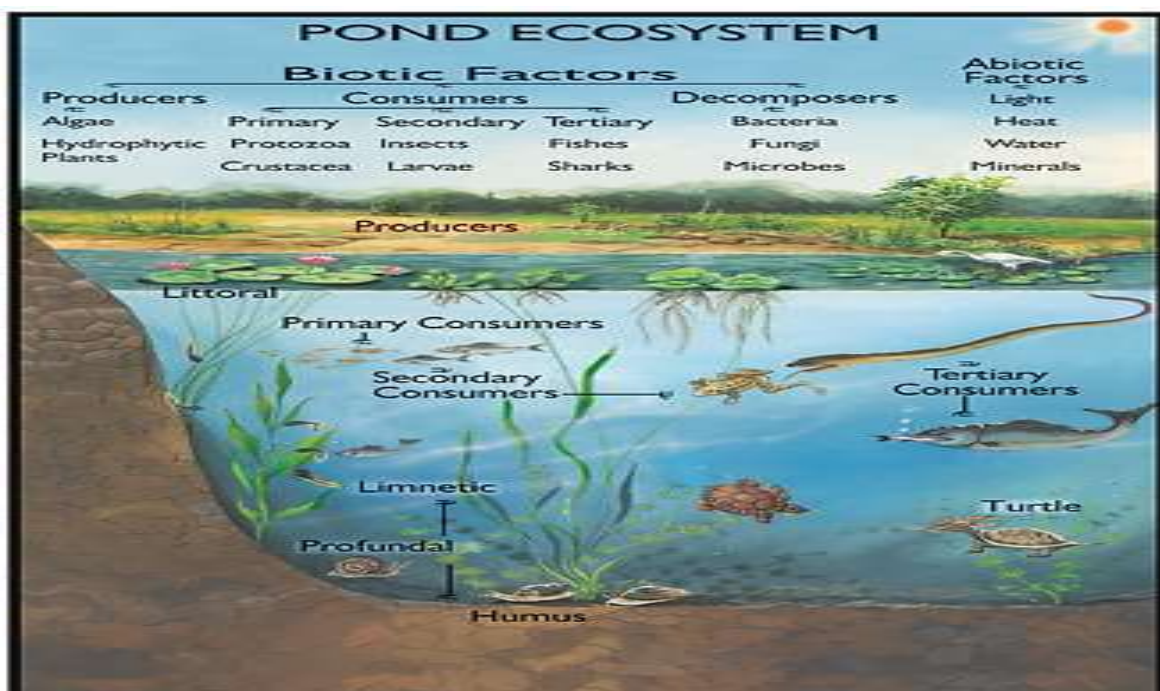
### Flow chart of classification of ecosystem



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.



In this project students are going to observe the effects of various abiotic factors on the biotic factors. Students learn the different trophic levels in the pond ecosystem





# CHAITANYA DEGREE & PG COLLEGE FOR WOMEN

Affiliated to Andhra University, Chaitanya nagar, Old Gajuwaka, Visakhapatnam-530026.



GPS Map Camera

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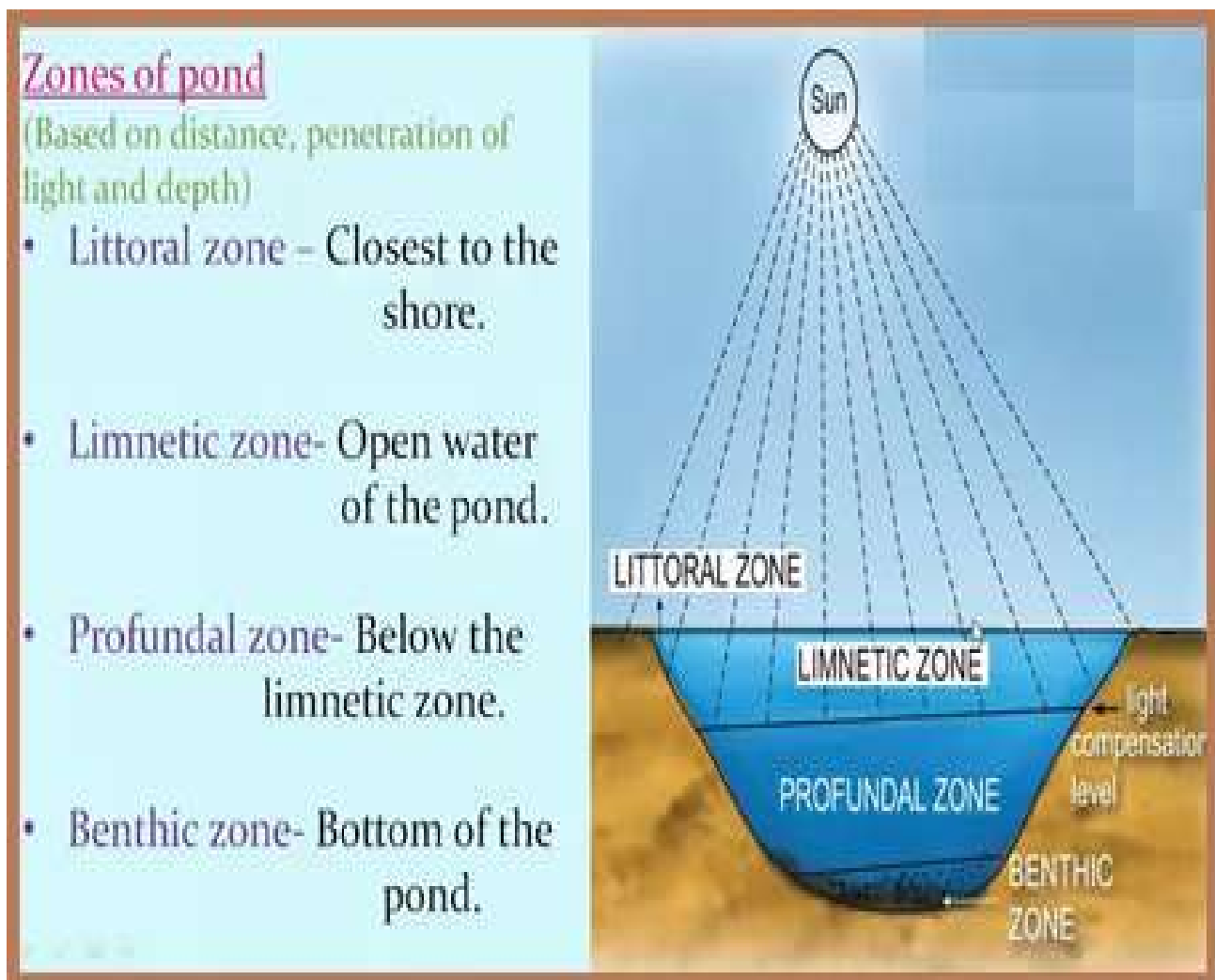


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## CHARACTERISTICS OF POND ECOSYSTEM

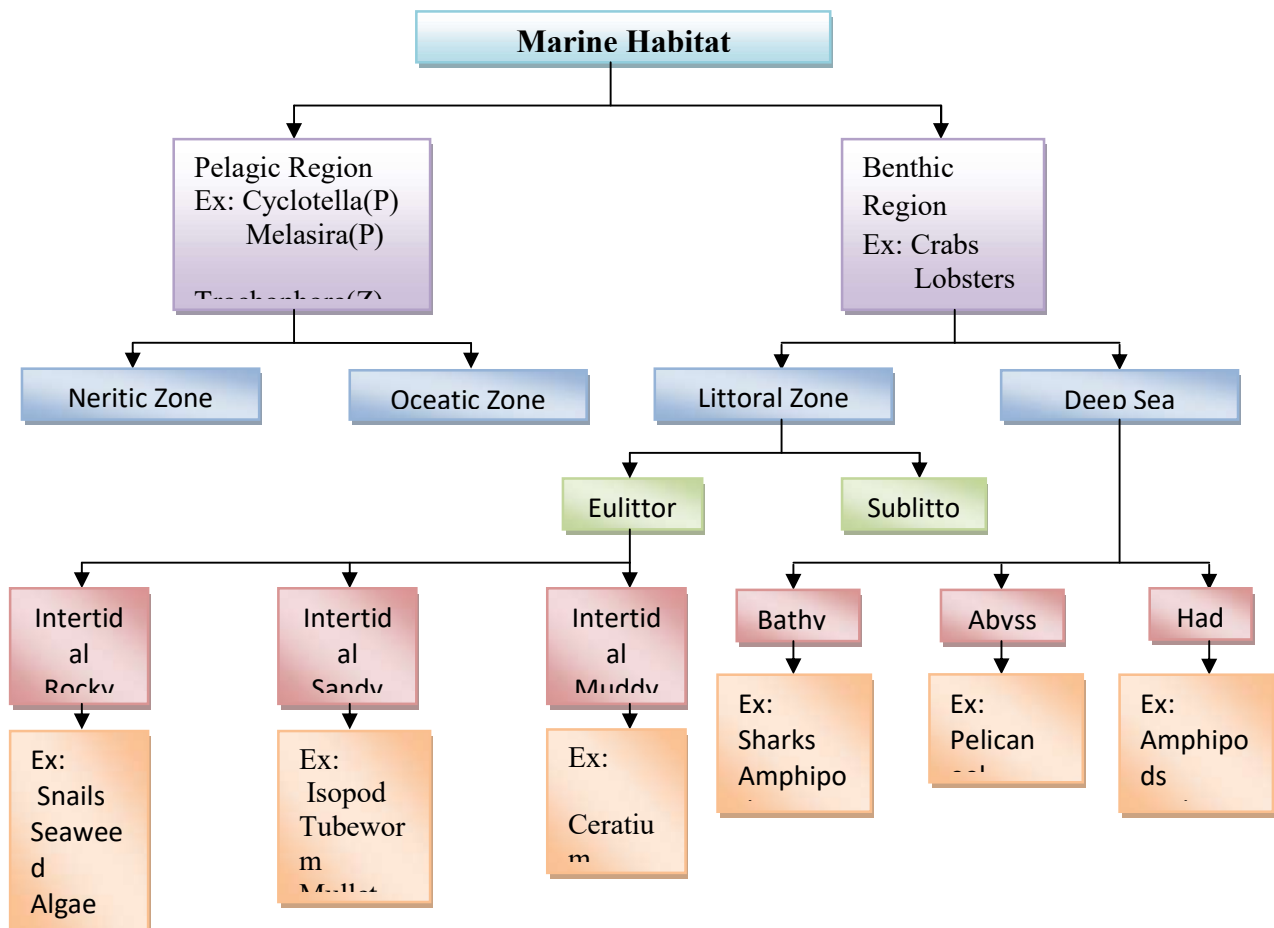
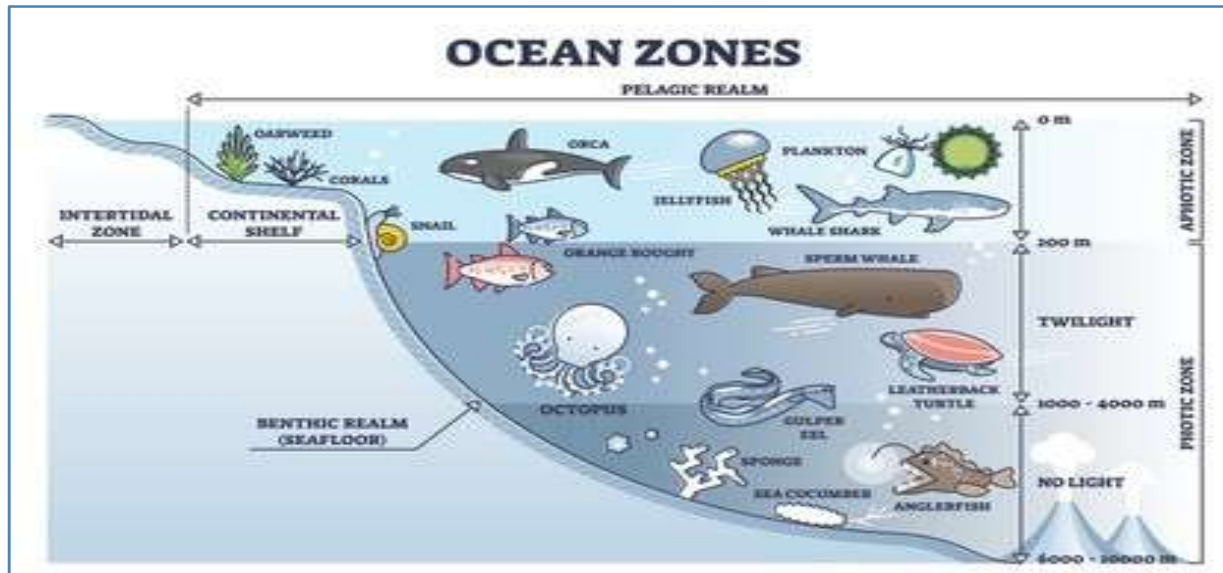
The following are the main characteristics of the pond ecosystem:

- The water in the pond ecosystem is stagnant.
- Either natural or artificial boundaries surround the pond ecosystem.
- The pond ecosystem exhibits three distinct zones, the littoral zone, limnetic zone, profundal zone, and benthic zone.
- The biotic components of the pond ecosystem occupy different levels in the pond ecosystem, therefore, avoiding 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.
- Pond ecosystems show a wide range of variety depending on their size.



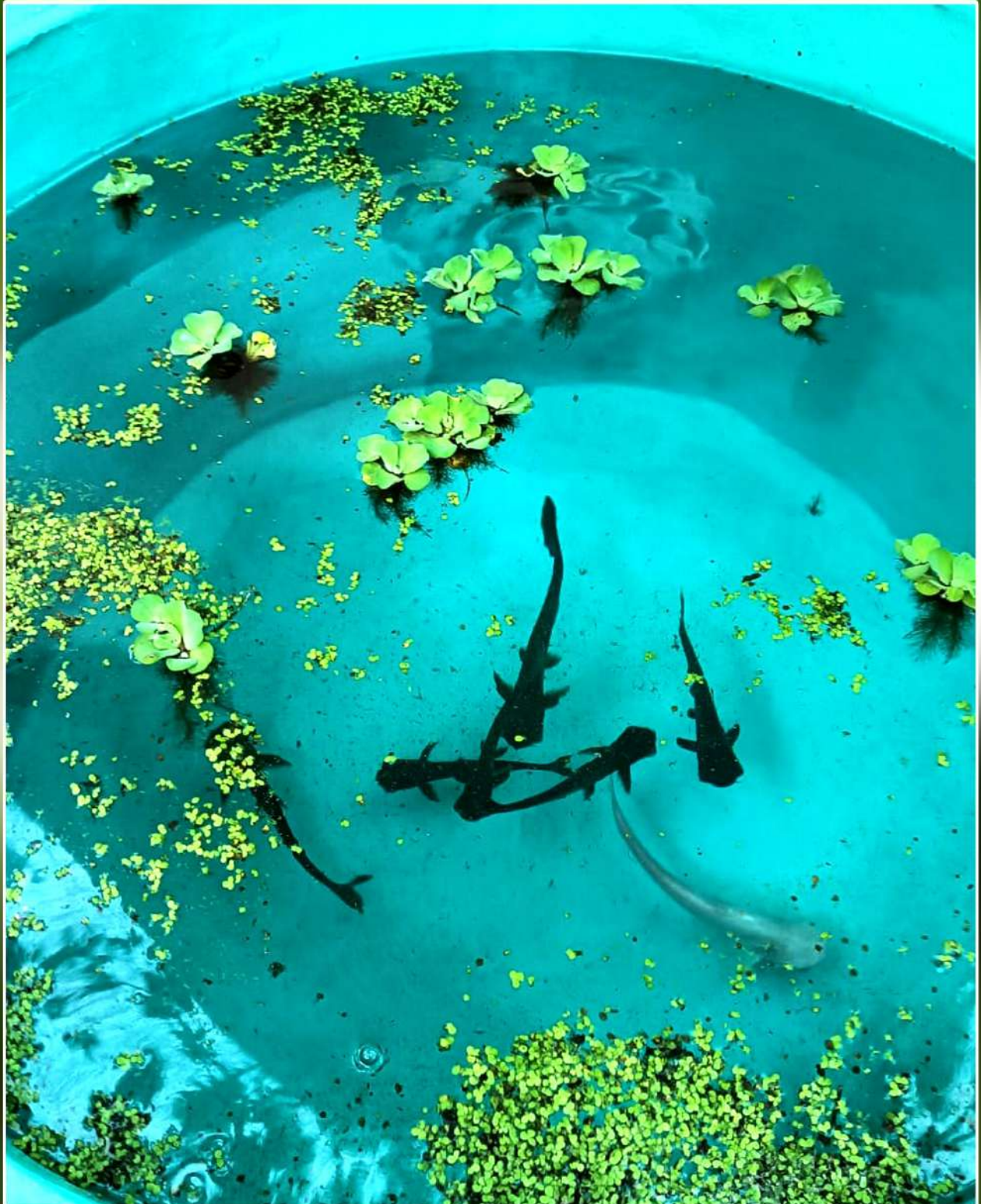
## MARINE ECOSYSTEM

Marine ecosystems are aquatic environments with high levels of dissolved salt, such as those found in or near the ocean. Marine ecosystems are defined by their unique biotic (living) and abiotic (nonliving) factors.





Marine ecosystems are also easily the most diverse of all the ecosystems on the planet. Coral reefs alone are home to over 25% of all marine life, despite occupying less than 1% of the ocean floor.





## DESERT ECOSYSTEM

Deserts are barren areas of land characterised by extremely high or low temperatures, with low rainfall and scarce or no vegetation. Deserts are examples of terrestrial ecosystems, which are found throughout the world. Neither all deserts are flat, nor do all deserts have cacti or oases.

### FAUNA:

Camels, foxes, jackals, owls, hyenas, wild goats and sheep, vultures, scorpions, ostriches, yaks, hawks, and desert reptiles including varieties of snakes and lizards, are the prominent animal species (fauna) of this terrestrial ecosystem.

### FLORA:

These plants include: yuccas, ocotillo, turpentine bush, prickly pears, false mesquite, sotol, ephedras, agaves and brittlebush.



