

बीक्षणः

STUDENT'S MAGAZINE

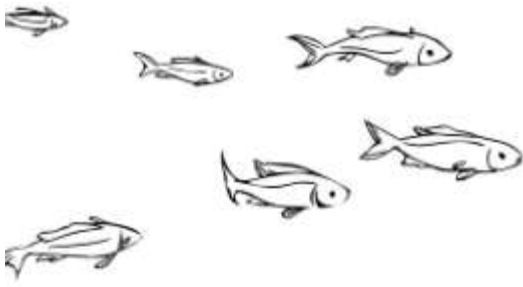
# THE OBSERVATION

*"Environment and Biosphere"*



ISSUE 3  
2023

DEPARTMENT OF ZOOLOGY  
SETH ANANDRAM JAIPURIA COLLEGE



A Student's Magazine

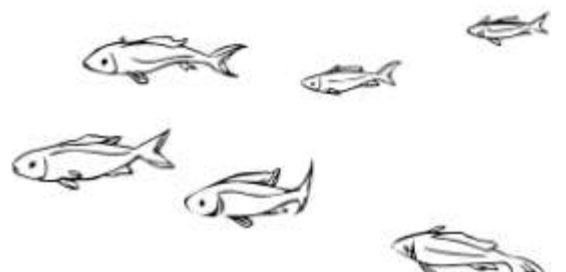
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THIRD EDITION  
JUNE 2023

DEPARTMENT OF ZOOLOGY

SETH ANANDRAM JAIPURIA COLLEGE





Dear Readers

I am glad to announce that third issue of e-magazine 'বীক্ষণ , The Observation' is being published on the 5th June, 2023 on the theme 'Environment and Biosphere'.

The issue has been decorated with writings, photographs, drawings or paintings related to the theme. The design of cover and back pages as well as presentation and editing of the magazine has been done by the students.

Beyond the burden of curriculum, our department encourages students to get involved in various extra-curricular activities. They are motivated for participation in seminars, poster/ paper presentation, wild life rally, field study, cultural programs etc.

We believe in “The moment you doubt whether you can fly, you cease for ever to be able to do it.” (*J. M. Barrie*). *We try our best to build confidence in the students so that they can fly long path of life ahead.*

*I appreciate the enthusiasm of the students for creative thoughts and cooperation of the teachers constantly guiding the students to bring out their best.*

*I hope that this issue of the magazine will entertain you as like the previous years.*

*Regards*

*Dr Ipsita Chanda  
Head of the Department*

# Editor's Letter

The Magazine **বীক্ষণ** (The Observation) has been made collectively by the students of the zoology department, Seth Anandram Jaipuria College. This issue of the magazine “Environment and Biosphere”, promotes the awareness of the nature, the threats faced by it and also focus on some miracles of the nature.

The main objective of this magazine is “Learning from the Nature” and thus the name **বীক্ষণ** which means observing something minutely and it is only by observing the nature, we get to learn a lot of things about it.

This issue of our magazine contains writeups related to the nature and photographs of animal species as well as some great natural spots. It is a joint effort made by all the students and faculty members of the zoology department. We have tried our best to bring forward several interesting facts about the nature that one should know in order to know the nature they live in.

The magazine also contains the students activities that have been performed in the department such as several local excursions, field trips, seminars and other cultural programmes.

Lastly we would like to thank our respected professors and the other members of the magazine committee with whose co operation we were able to make the idea work out. Hope you all will enjoy reading the magazine

**Anuska Sarkar**

Editor

**Ruchira Das**

Editor



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## **MALDIVES AS A BIOSPHERE RESERVE**

**KANINIKA GOSWAMI, SEMIV**

Biosphere reserves are 'learning places for sustainable development'. They are sites for testing interdisciplinary approaches to understanding and managing changes and interactions between social and ecological systems, including conflict prevention and management of biodiversity.

The beauty of Maldives stands out like a pearl in the ocean. The Maldives is world renowned for being rich in biodiversity. It has over 1000 varieties of fishes, and 250 kinds of corals that breathe life into the ocean. The Maldives occupies 5% of the total reef area on Earth. The Maldives is a remarkable archipelago of 26 geographical (and 20 administrative) atolls in the Indian Ocean, dominated by the marine environment. The lagoons and reefs within the atolls total 21,300 km<sup>2</sup>.



*Picture Courtesy: Google*

The Maldives is the richest marine biodiversity in the world. The coral reefs (21,000 km<sup>2</sup>) are the seventh most extensive in the world, representing 3% of the global reef area. They are home to 250 species of coral, teaming with over 1,000 species of fish, including iconic mega-fauna such as whale sharks and manta rays, as well as large populations of marine turtles and seabirds, whales, and dolphins.

In 2011, at the 40th anniversary of the United Nations Educational, Scientific and Cultural Organisation's (UNESCO's) 'Man and the Biosphere Program' in Dresden, Germany, the entirety of Baa Atoll in the Republic of Maldives was declared a UNESCO World Biosphere Reserve. With Addu City and Fuvahmulah declared as UNESCO Biosphere Reserves, it is hoped the Maldives find better ways to manage sustainable development and protect biodiversity. Some examples of Biosphere Reserve in Maldives are-



**Fig: Addu City, Source from google**

### **Addu City Biosphere Reserve:**

Addu City Biosphere Reserve is located north of the Chagos Archipelago and is the southernmost atoll of the Maldives. Consisting of about thirty small islands, the biosphere reserve is approximately 13000 hectares. Addu City is considered a city with a population of 10,000 people. The majority of this biosphere reserve is marine ecosystems with highly diverse reef ecosystems. There are 30 islands with about 17 of them uninhabited. Addu Atoll is divided by four channels Gan Kandu, Viligilikandu, Maakanda, and Kodakanda, and the island is formed by the peripheral reef.

### **Ecological Characteristics:**

The Addu City is composed of 30 islands in the south most sector of the Maldives. Of these 30 islands, 17 are uninhabited. This biosphere reserve boasts an impressive reef ecosystem with an outstanding biodiversity that includes over 1,200 fish species. Within the biosphere reserve, there are a large variety of ecosystems including lagoons, reef passes, seagrass beds, sandbanks, coral islands, lush tropical vegetation, mangroves, wetlands, brackish lakes locally known as kilos, agricultural land, and residential areas. In these ecosystems are a large variety of endemic species including the Maldivian Cardinal fish, Maldivian Grub fish, Maldives Triple fin, and Little Comb tooth Blenny. Ecosystems found in this biosphere reserve including seagrass and mangroves function as carbon sinks and combat the effects of climate change.

### **Socio-Economic Characteristics:**

The Addu city boasts a population of 19,319 inhabitants. The majority of them make a living on the fisheries and tourism related to underwater sports. The beauty of this biosphere reserve attracts many visitors which thus promotes tourism in the region. The growing tourism department in this biosphere reserve is important for advancing the region's commitment to sustainable development. The Maldivian atolls are at risk of rising sea levels due to climate change as well as an increasing number of invasive alien species.

### **Fuvahmulah City:**

Fuvahmulah Biosphere Reserve in southern Maldives is known for its incredibly diverse coral ecosystems. The atoll encompasses a variety of biodiversity within its coral, mangrove, and wetlands (also known as Khili) systems. The reef systems are home to significant populations of sharks mainly tiger, thresher, and whale sharks. However, it is the diversity of fish that is immensely significant with over 1,200 species found within this atoll. The Fuvahmulah biosphere reserve plays an important role for migratory birds with over 167 species found and five of which are endemic.



*Fig : Fuvahmulah City; source from Google*

### **Ecological Characteristics:**

Fuvahmulah has hard underlying bedrock on its outer rim areas, composed primarily of hardened coral and sand conglomerates. The geology of Fuvahmulah shows that the surface of the island is in the form of a very shallow bowl with two water bodies known locally as 'kilhis' at medial low points, making up two small linked sub-catchments. These two water bodies 1) Bandara Kilhi, and 2) Dhandi Magu Kilhi are surrounded by marshes, covered by thick layers of peat and mud. Coconut palms, trees, and shrubs grow around the marshes. The marshes are covered by *Cladium* sp and an unknown species of fern that is suspected to be an exotic invasive species brought to the island sometime in the 20th century. Due to the absence of a lagoon between the outer reef edge and the island beaches, the island topography is affected



by strong wave action from all sides. These unusual oceanic conditions have resulted in the famous “Thoondu”, an area of fringing reef that extends from the northern point of the island and the pebble beach with unique shiny small pebbles that are not seen in any other place in the Maldives.

### **Socio-Economic Characteristics:**

The Fuvahmulah Biosphere reserve is dependent largely on its tourism and fisheries. The marine biodiversity is incorporated into the economy within this atoll. There is a rich history within this biosphere reserve of tradition local medicinal practices. The biosphere reserve boasts a population of 8,510 inhabitants. The Fuvahmulah is the third most populated island in the Maldives. The people of Fuvahmulah value their socio-cultural individuality and maintain a life in harmony with nature. The communities within this biosphere reserve are environmentally conscious and promote sustainable development. Many of the species found in the marshes are used by the Fuvahmulah community for traditional medicine or other uses.

**Baa Atoll:** The Baa Atoll Biosphere Reserve is located in the central-western part of the Maldives in the Indian Ocean. The atoll is situated just north of the Kashidhoo Kandhoo channel, which geographically divides the northern chain of atolls. It supports one of the largest groups of coral reefs in the Indian Ocean and acts as a stepping stone for the transport of planktonic larvae of reef organisms from the western and eastern Indian Ocean. The reserve is home to a globally significant biodiversity among its numerous reefs and demonstrates a long history of human interaction with the environment.



*Fig: Baa Atoll; source from Google*

Baa Atoll is Biosphere Reserve is one of twenty official regions of the Maldives. The area is located in the prime area of the country. The atoll makes up a part of the double chain of atolls at the archipelago’s main zone. It is made up of 76 islands out of which 13 are occupied by local island inhabitants. 15 islands are tourist islands with resorts. The rest of the islands are left deserted.

### **Ecological Characteristics:**

Baa Atoll has a warm and humid tropical climate. The weather is dominated by two monsoon periods – a rainy monsoon period, which lasts from May to November, and a dry monsoon period, which lasts from January to March. The dominant natural environment of the reserve is marine, surrounded by the Deep Ocean. The water depth varies considerably and includes lagoons with depths ranging from 30 m to 80 m, opening into the Indian Ocean, while channels running through the atoll may be up to 250-300 m in depth. The lagoons enclose a variety of reef structures including faros, micro-atolls, patch reefs and knolls.

The main habitat types found in the reserve are coral reefs, islands, sea grass beds, and mangroves. Coral reefs are the most important habitat type in terms of area as well as biodiversity. Maldivian coral reefs are home to the richest diversity in the region and are the seventh largest in the world, accounting for 5% of the world's reef area. The coral reefs support a high diversity of reef animals, including approximately 250 species of corals (stony and soft corals) and 1,200 reef and reef-associated fish species, a population of marine turtles, manta rays (*Manta birostris*), whale sharks (*Rhincodon typus*) and seabirds. These also include threatened and endangered species such as the green turtle (*Chelonia mydas*), hawksbill turtle (*Eretmochelys imbricata*), Napoleon wrasses (*Cheilinus undulatus*), and tawny nurse shark (*Nebrius ferrugineus*).

### **Socio-economic characteristics:**

The Baa Atoll Biosphere Reserve comprises 75 islands, 13 of which are inhabited by a population of approximately 12,000 people. The present population in the Maldives is culturally homogeneous, although the original population came from a varied ethnic mix of Indo-Aryan, Dravidian, Sinhalese and Arab origin. The most important human activities in the area are tourism and fisheries. While resorts have become the main economic driver, tuna and reef fishing remain an important activity. Production of handicrafts and other materials for the tourist industry is also significant. Six islands have been developed as resorts for tourism and more than 350,000 tourists now visit the area each year.

### **Conclusion:**

The goal of establishing a biosphere reserve in the Maldives is to preserve all forms of life in their entirety, including their support systems, in order to serve as a referral system for monitoring and evaluating changes in natural ecosystems. It should be noted that Biosphere Reserves are not a replacement or alternative, but rather a supplement to existing protected areas.

## **THE 7<sup>TH</sup> SENSE OF ANIMALS-NATURAL DISASTER INDICATOR**

**ANINDITA BANERJEE, SEM VI**

**2019**, the year when the massive Tsunami of Death was broke due to global pandemic- **SARS-CoV-2**, Life has become totally unpredictable for us. Every moment, care about any kind of terrible disaster to occur. Even today, nobody can reliably predict when and where a catastrophe will occur. However, animals seem to sense the impending danger hours in advance.

We-the smartest animals on earth have invented a Disaster-Early Warning System, consisting of thousands of measurement stations to warn inhabitants living in areas at risk of such calamities. However, these systems are extremely complex from a technical perspective, it also swallows up a huge amount of money each year. For centuries, anecdotal stories have circulated about animals possessing some primal 7<sup>th</sup> sense that alerts them to an imminent natural disaster. They have different or heightened sensory capability compared to humans. In case of Elephants, that reportedly made for higher ground before the Tsunami hit, one theory is that they picked up on Infrasound waves generated by the tremor. These waves have a fundamental frequency of **20 Hz** or lower, and fall outside the limits of normal human hearing (the bottom note on a piano A0, has a frequency of about 27.5 Hz and is generally the lowest tone humans can differentiate). Infrasonic sound waves can be spawned by intensely energetic occurrences like earthquakes, volcanic eruptions, avalanches, lightning, meteors, and iceberg calving. Elephants, Rhinos, Hippos, Whales, Felines, Dogs, and many Birds rely on infrasonic sounds for both communication and navigation. When the Sri Lankan Elephants detected the initial low frequency rumblings coming from the Indian Ocean, it wasn't as if they sensed the coming tsunami, they just instinctively moved away from the source of the sound, which, in this case, happened to be the right decision. Many animals, insects, and birds are also particularly sensitive to Rayleigh waves, a type of surface wave that travels along solid ground. After the initial rupture, the waves would have travelled through the earth's crust from the epicentre, causing minute vibrations. The waves are inaudible and travel at ten times the speed of sound, and could therefore have been noticed by those animals sensitive to them well before the slow-moving tsunami crashed ashore. Humans actually have **mechanoreceptors** in our skin called **Pacinian corpuscles** which act to detect changes in vibration and pressure, but, as their optimal sensitivity is 250 Hz, and Rayleigh waves generated by earthquakes are typically below 20 Hz, they do little for us in these situations. Ants have a fascinating ability to seemingly anticipate both earthquakes and coming rainstorms. A recent study in Germany documented red wood ants and their propensity to build nests along active fault lines. The three year study showed that the ants, in the hours leading up to a quake, would go about their daily routine, but would stay awake and outside their mounds at night, even though this made them vulnerable to predators. The day after the quake hit, the ants would revert to their normal behaviour.

Though researchers are still trying to figure out the mechanism that causes the change in behaviour, it's proposed that ants have receptors that can pick up on barely detectable changes in atmospheric gases and electromagnetic fields that are the by-product of tremors and storms. Ants will often build up mounds around their ground holes for extra protection before heavy rains. They'll also seek out higher nesting spots, such as the tops of tree stumps and potted plants, in an effort to avoid being washed away. For years, farmers have been tipped off to coming rain by noticing a dramatic uptick in ant activity before a downpour.

Humans are **trichromatic** (meaning we have three different colour-receptor cones in our eyes), whereas most marsupials and many species of fish are tetrachromatic (meaning they have four different type of colour receptors in their eyes) which allows them to see and thus notice things we can't see. In fact, a large proportion of women have a human genetic variation which makes them '**functional tetrachromats**' meaning they perceive finer differences in colour than most people. Perhaps this is why more women appear to experience a stronger emotional response to art and fashion than men. Other types of animals, called monochromats and dichromats, have only one or two types of sensing cones and so cannot see the variations in colour that humans can.

Zoologists tell us that migratory birds can get compass information from the sun, the stars, and by sensing the earth's magnetic field. Also they get information from the position of the setting sun and from landmarks seen during the day. There's even evidence that sense of smell plays a role, at least for homing pigeons.

Obviously, scientific understanding of the types of perception which humans are not physically capable of, is going to lag far behind our study of phenomena that we have always known is "there". So it should come as no surprise that science is not yet able to define in precise terms how certain species can predict certain types of disasters better than we can.

For reliable prediction of earthquakes, volcanic eruptions or hurricanes, the only remedy to get rid of them is, we. Humans could use the knowledge of animals to benefit us.



## **WHAT REALLY KILLED THE DINOSAURS**

SAYANTAN MONDAL, SEM II

The dinosaurs are one of the extinct reptiles that lived about 65 million years ago. They lived for almost 165 million years. Most scientists believe that an asteroid collision with earth was the key event that caused the extinction of the dinosaurs at the end of the cretaceous period about 65 million years ago. Other scientists however argue that though the asteroid impact was surely the final blow, other factors were at work long before the collision. The climate change and a phenomenon known as temperature dependent sex determines (TSD) may be the real culprit behind the dinosaurs' demise.

### Was it the impact of an enormous asteroid, or did nest marauding mammals end the dinosaurs reign?

Either phenomenon may have put the nail in the dinosaurs' collective coffin, but there may have been a third potential culprit Temperature dependent sex determination or TSD – that ultimately caused the demise of these giant reptiles. It is believed that dinosaurs were probably much like their modern counterparts: alligators, crocodiles and sea turtles and all of these animals today exhibit some form of TSD.

### So how does TSD work?

For many reptiles, the incubation temperature of eggs determines the sex of the offspring. A shift of a few degrees is all it takes for the eggs to yield all female or male offspring. For instance, take alligator eggs. If these are incubated at 86 degrees Fahrenheit during the middle stages of development, only females will hatch. If the same eggs are incubated at 93degree, only males will emerge. At temperature between these extremes, mixed litter of males and females will be born. TSD may sound strange to us. However, it's a fairly common phenomenon among cold blooded crowd.

The upside of TSD:The advantage of TSD is that it allows mother to bring, "pre-adapted" young in the world. What does it mean? TSD enables the mother to match the sex of the youngsters with the conditions of environment where they will be born. Sounds good on paper right? But while the survival of the individual is a worthy goal, this gender unbalance method does not exactly halter the species as a whole.

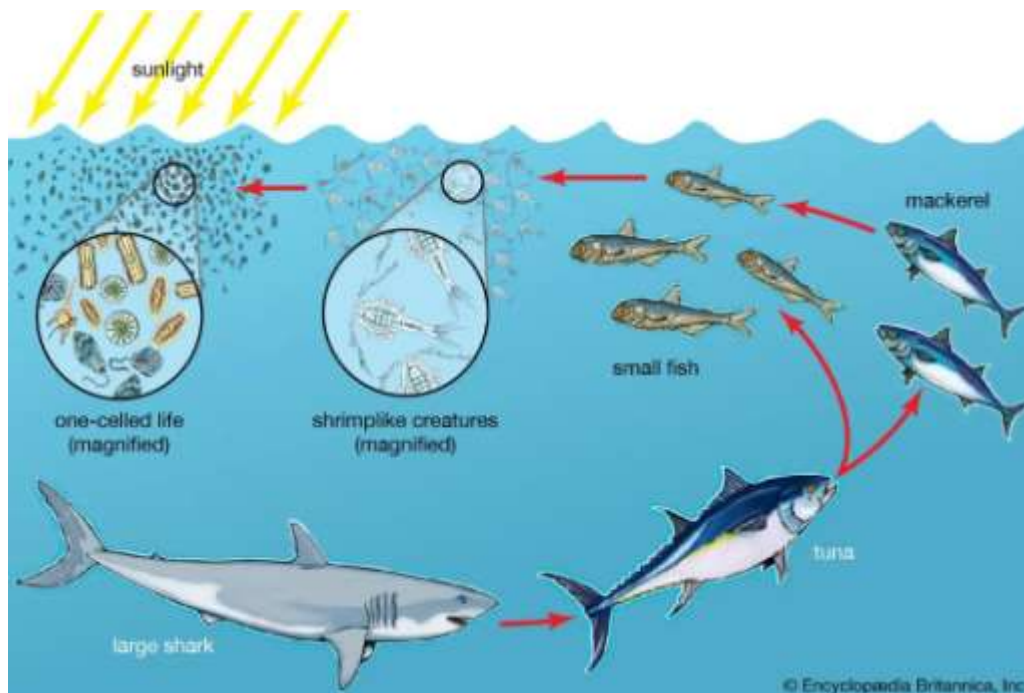
The case of Dinosaurs There may have been a problem with TSD effect on the dinosaurs. For about 50 million years earth's climate was very stable. The TSD mechanism worked well enough to ensure the sex ratio. However as the climate changed, and earth became more of a seasonal planet, the mechanism no longer worked so well.

TSD was effective only for dinosaurs that lived in coastal areas, where temperature remained stable because of the ocean's moderating influence on the climate. Some dinosaurs may have built nests, probably to regulate the temperature of their egg. "Dinosaur hunters" periodically found such nests filled with eggs, the precious cargo were arranged in a spiraling pattern. In at least one such instance, a nest builder- a late cretaceous era critter called an aviator was discovered sitting on top of a nest.

While the demise of dinosaur is nowadays routinely blamed on a huge asteroid that slammed into the earth, scientists believed that this was just the final blow to a population already suffering from gender inequalities because of climate changes. Thus it's likely that the cretaceous period ended not with a bang but with a whisper most likely from all male or female choruses of dinosaurs.

## ECOSPHERE

MD ZULFIKAR, SEM II



The biosphere is a system characterized by the continuous cycling of matter and an accompanying flow of solar energy in which certain large molecules and cells are self-reproducing. Water is a major predisposing factor, for all life depends on it. The elements carbon, hydrogen, nitrogen, oxygen, phosphorus, and sulphur, when combined as proteins, lipids, carbohydrates, and nucleic acids, provide the building blocks, the fuel, and the direction for the creation of life. Energy flow is required to maintain the structure of organisms by the formation and splitting of phosphate bonds. Organisms are cellular in nature and always contain some sort of enclosing membrane structure, and all have nucleic acids that store and transmit genetic information. All life on Earth depends ultimately upon green plants, as well as upon water. Plants utilize sunlight in a process called photosynthesis to produce the food upon which animals produce the food upon which animals feed and to provide, as a by-product, oxygen, which most animals require for respiration.

At first, the oceans and the lands were teeming with large numbers of a few kinds of simple single-celled organisms, but slowly plants and animals of complexity evolved. Interrelationships developed so that certain plants grew in association with certain other plants, and animals associated with the plants and

with one another to form communities of organisms, including those of forests, grasslands, deserts, dunes, bogs, rivers, and lakes. Living communities and their non-living environment are inseparably interrelated and constantly interact upon each other. For convenience, any segment of the landscape that includes the biotic and abiotic components is called an ecosystem. A lake is an ecosystem when it is considered in totality as not just water but also nutrients, climate, and all of the life contained within it. A given forest, meadow, or river is likewise an ecosystem. One Ecosystem grades into another along zones termed ecotones, where a mixture of plant and animal species from the two ecosystems occurs. A forest considered as an ecosystem is not simply a stand of trees but is a complex of soil, air, and water, of climate and minerals, of bacteria, viruses, fungi, grasses, herbs, and trees, of insects, reptiles, amphibians, birds, and mammals. Stated another way, the abiotic, or non-living, portion of each ecosystem in the biosphere includes the flow of energy, nutrients, water, and gases and the concentrations of organic and inorganic substances in the environment. The biotic, or living, portion includes three general categories of organisms based on their methods of acquiring energy: the primary producers, largely green plants; the consumers, which include all the animals; and the decomposers, which include the microorganisms that break down the remains of plants and animals into simpler components for recycling in the biosphere. Aquatic ecosystems are those involving marine environments and freshwater environments on the land. Terrestrial ecosystems are those based on major vegetation types, such as forest, grassland, desert, and tundra. Particular kinds of animals are associated with each such plant province.

## **EXTINCTION AND ITS EFFECT ON THE ENVIRONMENT**

**OIENDRILA CHAKRABORTY, SEM IV**

Extinction is the complete disappearance of a species from the Earth. It occurs when there are no living individuals of that species remaining. Extinction can be a natural process, but it is also caused by human activities. Considering the rate at which the extinction of animals has been occurring, it is a major concern for environmentalists and scientists. The loss of species can have far-reaching and profound effects on the environment, from ecosystem function changes to biogeochemical cycles.

### **EFFECTS ON ENVIRONMENT**

When any species goes extinct, the effect is seen throughout the ecosystem. Species interact with each other in complex ways, and the loss of one species can disrupt the entire system. For example, the extinction of a predator can lead to an increase in the population of its prey, which can affect the abundance of other species in the ecosystem. In some cases, the loss of a single species can also lead to a cascade of extinctions, as the loss of one species affects the survival of others that depend on it.

Animals play an important role in nutrient cycling or the food chain in the ecosystem. The excretion of nutrients by animals contributes to soil fertilization, which enhances plant growth. The loss of animals can disrupt these nutrient cycles, leading to changes in the structure and function of ecosystems.

Extinctions also affect the biogeochemical cycles, which are the processes that regulate the flow of nutrients and energy through ecosystems. For example, the extinction of marine mammals can lead to a decline in the transport of nutrients from the deep ocean to the surface, which can affect the productivity of marine ecosystems. Similarly, the loss of large predators on land can affect the movement of nutrients through food webs, leading to changes in nutrient cycling and ecosystem function.

Last but not least, the most significant impact of extinction is the loss of biodiversity. Biodiversity is essential for the functioning of ecosystems, as it provides the genetic diversity necessary for adaptation and resilience in the face of environmental change. The loss of species can reduce the genetic diversity of ecosystems, making them more vulnerable to environmental stressors such as climate change, habitat loss, and pollution.

### **CONCLUSION**

In conclusion, the extinction of animals can have profound effects on the environment, from changes in ecosystem function to alterations in biogeochemical cycles. The loss of species can disrupt nutrient cycling, alter biogeochemical cycles, and reduce the biodiversity of ecosystems. Understanding the impacts of extinctions on the environment is essential for developing strategies to conserve species and maintain the health and resilience of ecosystems.



## **CREEPIEST ANIMALS**

ABHISEK KUMAR SINGH, SEMII



### **BLOB FISH**

**SCIENTIFIC NAME:** *Psychrolutes microporosus*

Blob fish is a deep sea fish that inhabits the deep-water coasts of mainland Australia and Tasmania. It has been carrying the title of world's ugliest animal since 2013, but their strange gelatinous physiology is just a reflection of how they have adapted to suit an entirely

alien environment. Apart from this, it also soared to fame with memes, songs, and even TV characters created in its honor.



### **GOLIATH BIRD-EATING TARANTULA**

**SCIENTIFIC NAME:** *Theraphosa blondi*

The Goliath Bird-Eater is the king of the spiders. Weighing up to six ounces and leg span of nearly a foot, this tarantula is the largest arachnid on the planet. Goliaths don't usually eat birds, they are big enough to be able to do-and occasionally they do. Bird eater came from an 18<sup>th</sup> century engraving that showed another kind of tarantula eating a hummingbird, which gave the entire *Theraphosa* the name bird eater.



## **COCONUT-CRAB**

**SCIENTIFIC NAME:** *Birgus latro*

The Coconut Crab is a species of terrestrial hermit crab, also known as the robber crab or palm thief. It is the largest arthropod in the world, with a weight of upto 4.1 kg. It can grow to upto 1 metre in width with the tip of one leg to the tip of another. These scary animals also known to cannibalize one another with little hesitation.



## **ARTHROPLEURA**

The extinct invertebrate *Arthropleura*, a relative of centipedes and millipedes, lived during the carboniferous period (359.2 million to 299 million years ago) and ranks among the largest insects ever described; estimates from fossil armour segments suggests that the species have grown to more than 2 metres.



## **AYE-AYE**

**SCIENTIFIC NAME:** *Daubentonia madagascariensis*

A resident of Madagascar, the aye-aye is easily the most unusual looking lemur in the world-but while some people find these primates to fall into the category of animals that are so ugly that they are cute, that's not an impression that's generally shared by the locals who share a habitat with aye-aye. It is the world's largest nocturnal primate.

## MARINE ECOSYSTEM

SOMA BANNERJEE, SEM IV



Marine ecosystems are the largest of Earth's aquatic ecosystems and exist in waters that have a high salt content. These systems contrast with freshwater ecosystems, which have a lower salt content.

**Marine coastal ecosystem - Coral reefs:** Coral reefs are one of the most well-known marine ecosystems in the world, with the largest being the Great Barrier Reef. These reefs are composed of large coral colonies of a variety of species living together. The corals form multiple symbiotic relationships with the organisms around them.

**Mangroves:** Mangroves are trees or shrubs that grow in low-oxygen soil near coastlines in tropical or subtropical latitudes. They are an extremely productive and complex ecosystem that connects the land and sea.

**Seagrass meadows:** Seagrasses form dense underwater meadows which are among the most productive ecosystems in the world. They provide habitats and food for a diversity of marine life comparable to coral reefs. This includes invertebrates like shrimp and crabs, cod and flatfish, marine mammals and birds. They provide refuge for endangered species such as seahorses, turtles, and dugongs.

**Kelp forests:** Kelp forests occur worldwide throughout temperate and polar coastal oceans.

**Estuaries:** Estuaries occur where there is a noticeable change in salinity between saltwater and freshwater sources. This is typically found where rivers meet the ocean or sea.

**Lagoons:** Lagoons are areas that are separated from larger water by natural barriers such as coral reefs or sandbars. There are two types of lagoons, coastal and oceanic/atoll lagoons.

**Salt marsh:** Salt marshes are a transition from the ocean to the land, where fresh and saltwater mix. The soil in these marshes is often made up of mud and a layer of organic material called peat. **Intertidal zones:** Intertidal zones are the areas that are visible and exposed to air during low tide and covered up by saltwater during high tide.

## **BIOSPHERE**

SUDIP DAS, SEM II

The earth is made up of land water and air. These form three domains of the earth—the lithosphere, the hydrosphere, and the atmosphere. All these three domains combine to form the life-giving domain of the earth, called the Biosphere. The biosphere is the narrow zone of contact between land, water, and air where life exists.



The biosphere is divided into the plant kingdom and the animal kingdom. Living organisms on the earth are broadly classified as plants and animals. All living organisms are linked to each other a, and to the biosphere.

Humans affect the balance of the biosphere by releasing the gases and smoke emitted by factories and vehicles into the air. The quantity of gases like carbon monoxide, dust, and, smoke has increased in the air, leading to air pollution.

Wastewater and chemicals from residences and factories are disposed of in rivers, lakes, and ponds. This has resulted in water pollution.

Biosphere reserve: -

Kanchenjunga: Established in 2000. The core zone of Kanchenjunga National Park has already been designated a world heritage in 2016 under the 'mixed' category (first from India in this category). Situated in the Himalayan trans-axial belt, it is the third highest peak of the world, Kanchenjunga (8, 586m), belongs to the state of Sikkim.



It includes the range of Eco lines, varying from subtropical to arctic, as well as natural forests in different biomes. The core zone of this biosphere reserve alone has over 150 glaciers and 73 glacial lakes, the prominent is the famous 26km long Zemu glacier.

It includes the red panda, snow leopard, Himalayan black bear, and herbivores of species musk deer,, great Tibetan sheep, blue sheep, Boral, and barking deer. Tribes to Lepcha Tribal settlement.

## **PARASITES, ECOLOGY, AND THE ENVIRONMENT**

SUBHAM TIWARI, SEM IV

### **WHAT ARE PARASITES?**

Parasites are organisms that live on or inside a host and derive their nourishment from it. They are ubiquitous in the natural world and their complex and diverse ecology. They significantly impact ecosystems, affecting everything from individual hosts to entire communities and ecosystems. The study of parasites and their interactions with hosts and the environment is known as parasite ecology.

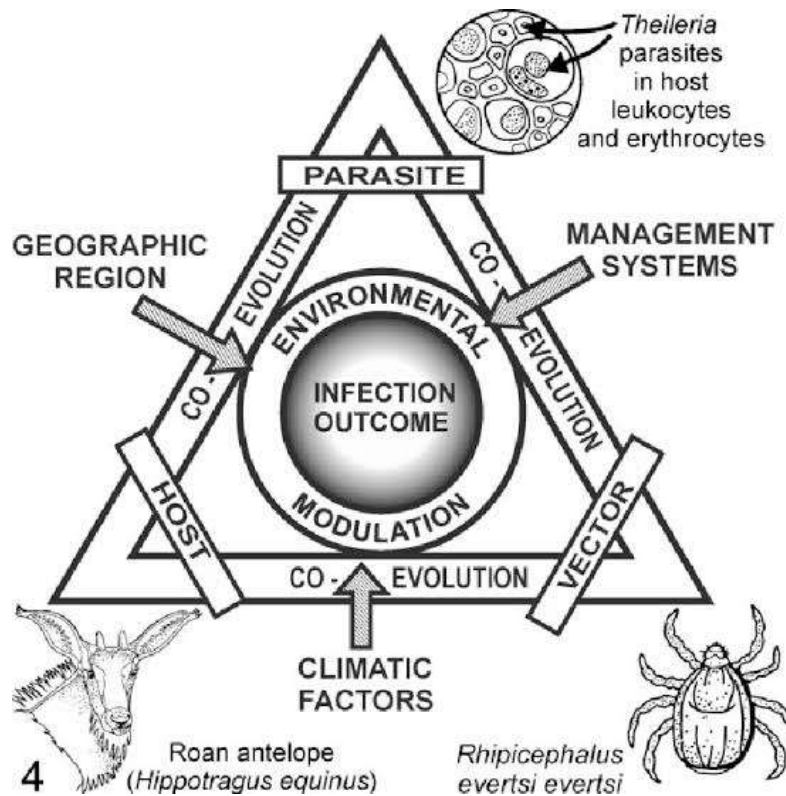
### **HOW A PARASITE AFFECTS AN INDIVIDUAL?**

Parasites have a profound impact on host populations, and their effects on individual hosts can range from mild to severe. They can cause disease, reduce host fitness, and even kill their hosts. For example, the parasite *Trypanosoma brucei*, which causes sleeping sickness in humans and other mammals, can cause death in infected hosts if left untreated. They also have indirect effects on host populations by altering host behaviour, physiology, and ecology. For example, parasites can alter the feeding behaviour hosts, causing them to eat more or less, or change their patterns of movement. Parasites can also alter host physiology by affecting hormone levels or other metabolic processes, which can have cascading effects on host behaviour ecology.

Parasites also have important ecological roles beyond their interactions with individual hosts. They can influence community structure by altering the abundance and distribution of host species. For example, by reducing the abundance of a particular host species, leading to a shift in the composition of the community. Alternatively, parasites can increase the abundance of a particular host species, leading to a shift in the competitive dynamics of the community.

### **EFFECTS ON ECOSYSTEM**

Parasites also have important effects on ecosystem processes, such as nutrient cycling and energy flow. For example, parasites can affect the productivity of primary producers by altering the behaviour or physiology of their herbivorous hosts. They can also affect nutrient cycling by altering the decomposition of dead host tissue or by modifying the behaviour of scavengers or decomposers. Parasites are sensitive to environmental conditions, and their ecology can be affected by environmental changes such as habitat loss, climate change, and pollution, a parasite that depends on a particular host species may be affected by habitat loss or fragmentation, leading to a decline in their populations. Similarly, parasites that are sensitive to temperature or humidity may be affected by climate change, leading to changes in their distribution and abundance.



#### EFFECTS ON ECOSYSTEM

#### CONCLUSIONS

In conclusion, parasite ecology is a complex and diverse field with important environmental implications. They have significant impacts on host populations, community structure, and ecosystem processes, and are sensitive to environmental changes. The study of parasite ecology is essential for understanding and managing the complex interactions between hosts, parasites, and the environment.

## **ROSE-RINGED PARAKEET**

SAHIL SARKAR, SEMESTER-IV



### **TAXONOMY:**

**Kingdom:** Animalia

**Phylum:** Chordata

**Subphylum:** Vertebrata

**Class:** Aves

**Order:** Psittaciformes

**Genus:** *Psittacula*

**Species:** *krameri*



### **DISTRIBUTION:**

Since the 19th century, the rose-ringed parakeet has successfully colonised many other countries. It breeds further north than any other parrot species. It has established itself on a large scale in Germany, France, Belgium, the Netherlands, Italy, and especially the UK.

## PHYSICAL DESCRIPTION:

- The Rose-ringed parakeet is a medium-sized parrot.
- They are sexually dimorphic.
- Rose-ringed Parakeet has yellow-green plumage, long, graduated tail and rounded, hooked pinkish-red bill.
- Male shows black bib, narrow black and pinkish collar, extending from the bib, around the cheeks, to the nape sides where it tapers into a fine point. This half collar is bordered behind by narrow pink line extending across the nape, below an indistinct bluish crescent on the hind crown.
- Female has only a dull emerald-green collar, and lacks blue, pink, and black on the head.
- Rose-ringed parakeets measure on average 40 cm (16 in) in length, including the tail feathers, a large portion of their total length. Their average single-wing length is about 15 to 17.5 cm.



## HABITAT:

**Terrestrial Biomes:** Forest, Savannah, Desert.

**Wetlands:** Marsh, Swamp, Bog.

**Others:** Urban, Semi-urban, Agricultural fields.

## BEHAVIOUR:

- They are secondary cavity nester species. Also, they are motile, arboreal, and diurnal birds.
- Rose-ringed parakeets are social birds. They are active during the day spending their time, foraging, flying about, and resting in the shades of tree canopy during midday hours. They often gather in flocks that fly several miles to forage in farmlands and orchards.
- They are the foolhardy and opportunistic bird.



- **Mimicry:** They have three distinctive calls used to communicate with the other birds of same species. In the wild, this is a noisy species with an unmistakable squawking call. Captive Rose-ringed parakeets can be taught to speak. Both males and females are also able to mimic human speech. First, the bird listens to its surroundings, and then it copies the voice of the human speaker.
- **Mating Behaviour:** Rose-ringed parakeets are serially monogamous. In northwest India, Rose-ringed parakeets form pairs from September to December. The female lays 1 to 7 eggs and incubates them alone for about 3 weeks. The chick hatch altricial meaning they are helpless and depend on their parents for feeding and protection. The young fledge at 7 weeks of age and become independent when they are 2 years old. Reproductive maturity is usually reached at the age of 3 years.

**Diet and Nutrition:** Rose-ringed parakeets are herbivores, Granivores, Frugivores. So, they usually feed on buds, fruits, vegetables, nuts, berries, and seeds. In India, they eat cereal grains, and during winter also pigeon peas. In Egypt during the spring, they feed on mulberry, and in summer they feed on dates and eat from sunflower and corn fields.



**REPRODUCTION:** In north western India, Indian rose-ringed parakeets form pairs from September to December. They do not have life mates and often breed with another partner during the following breeding season. During this cold season, they select and defend nest sites, thus avoiding competition for sites with other birds. Feeding on winter pea crops provides the female with nutrients necessary for egg production. From April to June, they care for their young.

**Hormonal role:** Seasonal changes in testicular activity, plasma luteinizing hormone (LH), Estradiol (E2), testosterone (T), and 5  $\alpha$ -dihydrotestosterone (5  $\alpha$ -DHT) were related to pair bond



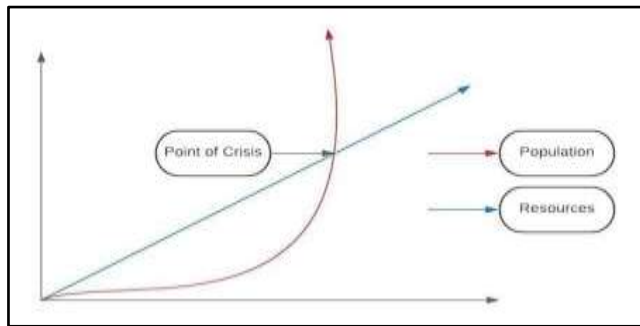
**CONSERVATION:** On IUCN Red List, rose-ringed parakeets are listed as a species of "least concern." There is no special status for these birds under CITES appendices, the United States Endangered Species Act list, or the United States Migratory Bird Treaty Act.



# POPULATION ECOLOGY

ROMITA DAS, SEM II

Population ecology studies the dynamics of species populations and how these populations interact with the wider environment. A population consists of individuals of the same species that live, interact, and migrate through the same niche and habitat.



A primary law of population ecology is the Malthusian growth model which states, “a population will grow (or decline) exponentially as long as the environment experienced by all individuals in the population remains constant. A simplified population model usually starts with four variables: Death rate per capita (D), Birth rate per capita (B), Immigration (I) and Emigration (E).

## POPULATION GROWTH:

Population Growth can be represented as:

$$N_t = N_0 + \{(B + I) - (D + E)\}$$

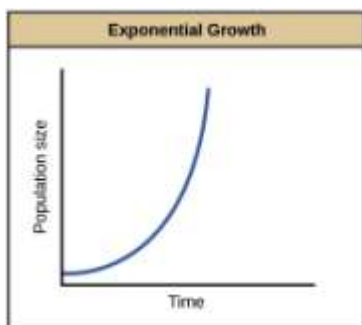
$N_t$  = Population at time t.

$N_0$  = Population at time t = 0.

There are two basic Population Growth Curves:

- Exponential Growth Curve.
- Verhulst Pearl Logistic Growth Curve.

## Exponential Growth Curve:



In exponential growth, a population's per capita growth rate stays the same regardless of population size, making the population grow faster and faster as it gets larger. It is a J shaped curve.

It can be represented as:

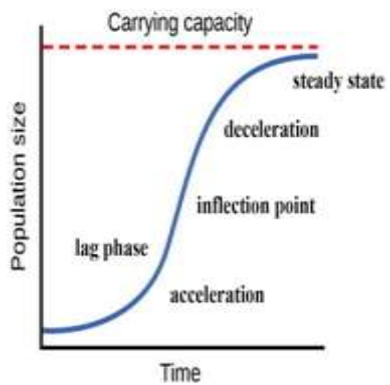
$$\frac{dN}{dT} = rN$$

$r$  = Intrinsic rate of natural increase or (Birth rate – Death rate) per capita.

$N$  = Population at time t = 0

$\frac{dN}{dT}$  = Rate of change of population.

## Verhulst Pearl Logistic Growth Curve:



In logistic growth, a population's per capita growth rate gets smaller and smaller as population size approaches a maximum imposed by limited resources in the environment, known as the carrying capacity (K). It is an S shaped curve.

It can be represented as:

$$dN/dT = rN\{(K-N)/K\}.$$

**r** = Intrinsic rate of natural increase or (Birth rate – Death rate) per capita.

**K** = Carrying capacity.

**N** = Population at time  $t = 0$

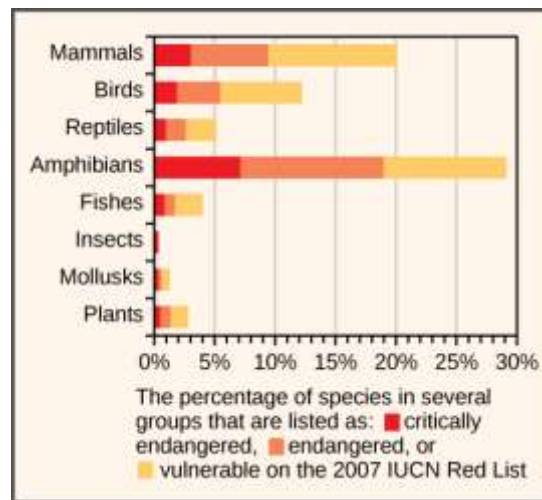
**$dN/dT$**  = Rate of change of population.

## **THE RED DATA BOOK**

**SOUMYA MITRA, SEM II**

The World Conservation Union (WCU) maintains a document called Red Data Book or Red List of taxa that are facing the risk of extinction. It was initiated in 1963. It provides information about the urgency and scale of conservation problems to the authorities.

The World Conservation Union (WCU) has recognised following seven Threat Categories or Red List Categories:



1) Extinct Species (EX): A species or taxon is said to be extinct when there is no reasonable doubt that even its last individual has died. Example: The Woolly Mammoth.



*Mammuthus primigenius* (The Woolly Mammoth)

2) Extinct in Wild (EW): A species or taxon is said to be extinct in the wild when exhaustive surveys have failed to record an individual in the expected or known habitats. Example: Pere David's Deer.



*Elaphurus davidianus* (Pere David's Deer)

3) Threatened Species(T): These species are abundant in some parts of their distribution range but severely depleted in other. They need to be conserved to avoid becoming rare, vulnerable or endangered. Example: Grizzly Bear.



*Ursus arctos horribilis* (Grizzly Bear)

4) Critically Endangered Species (CR): The species facing an extremely high risk of extinction in the wild in the immediate future are called critically endangered. Example: The Black Rhino.



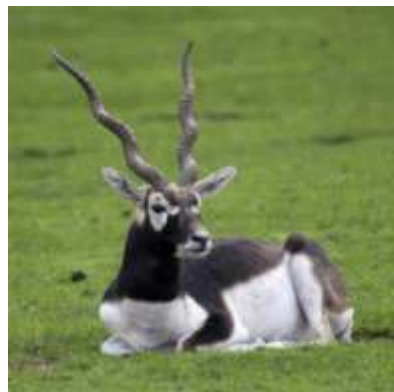
*Diceros bicornis* (The Black Rhino)

5) Endangered Species (E): These species are facing a high risk of extinction in the near future. Example: Asiatic Lion.



*Panthera leo persica* (Asiatic Lion)

6) Vulnerable Species (V): These species are not endangered, but are facing a high risk of extinction in the wild. Example: Black Buck.



*Antelope cervicapra* (Black Buck)

7) Rare or Lower Risk Species (R): These are small populations localized in certain geographical areas or habitats or are thinly scattered over extensive ranges. Example: Elephant.



*Elephantidae* (Elephant)



## **DEER**

SUBHADEEP NASKAR, SEM IV

**Systematic position: -**

**Kingdom:** Animalia

**Phylum:** Chordata

**Class:** Mammalia

**Order:** Artiodactyla

**Infraorder:** Pecora

**Family:** Cervidae

**Subfamilies:** Capreolinae

-Cervinae

-Hydropotinae



According to Goldfuss, 1820

**Type of genus** —*Cervus* Linnaeus, 1758

**Described about Animal –**

**Deer**, Any of the ruminants in the family Cervidae, which have two large and two small hooves on each foot and antlers on the males of most species and on the females of some species. Deer live mainly in



forests but may be found in deserts, tundra, and swamps and on high mountainsides. They are native to Europe, Asia, North America, South America, and northern Africa and have been introduced widely elsewhere. Females are usually called does, and male's bucks. Deer range in shoulder height from the 12-in. (30-cm) pudu (genus *Pudu*) to the 6.5-ft (2-m) moose. They typically have a compact body, short tail, and long, slender ears. They shed their antlers each year, and new ones grow in. The general form of the antler varies

among species. Deer feed on grass, twigs, bark, and shoots. They are hunted for their meat, hides, and antlers, mule deer, muntjac, red deer, roe deer, white-tailed deer.

### Behaviour:

1. Do not make nest and dens
2. Find safe and comfortable place and low hanging evergreen branches.
3. Stay close where they find good.
4. Eat grasses, plants and weeds.
5. An adult deer require 4-8 pounds of forage per day.

### Characteristics:

1. Cud chewing animal
2. Four chambered of stomach
3. Vision is best at night
4. Coat is reddish brown in summer and turn to greyish brown in winter
5. Have excellent smell and hearing capacity
6. Can run 40 miles/hour
7. Attractiveness power of spotted deer known as chital in India



### Reproductions:

1. The doe usually gives birth to 1 or 2 fawns.
2. Most fawns are born during May and June.
3. The fawn can stand immediately after birth.

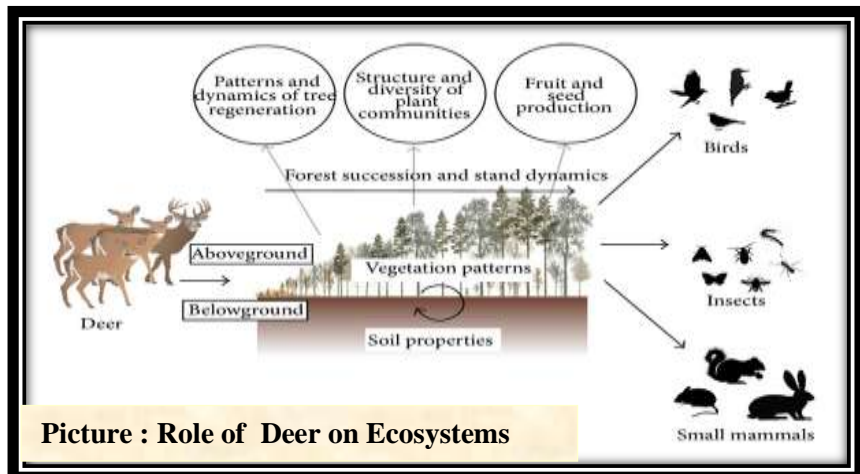
### Predators:

1. Tiger, 2. Wolves, 3. Dogs, 4. People

### Threats:

1. Disease: - Virulent diseases like CWD and EHD are deadly threats.
2. Urban development: - Cities and suburbs are taking over home ranges and habitats.
3. Predation :- Fawns are at high risk from coyotes, bears, and bobcats

### Role on Ecosystems:



Picture : Role of Deer on Ecosystems

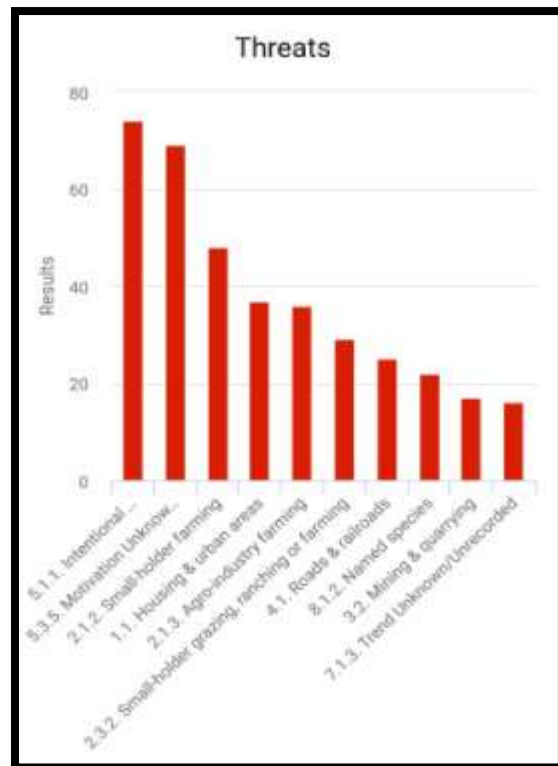
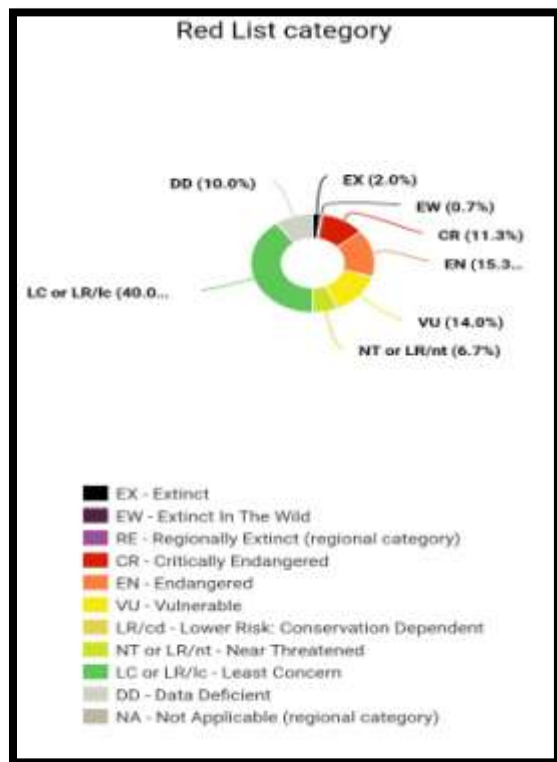
Deer serve several important functions in the ecosystem including keeping populations of producers in check, dispersing seeds, and serving as prey for secondary and tertiary consumers. Deer are grazers, primarily feeding on grasses and shrubs. This shapes the terrain of the ecosystem and even controls non-biological processes such as weathering and erosion based on plant density.

As deer eat plant matter, they also consume their seeds and deposit them elsewhere when they are released in the faeces. This aids in seed dispersal and is an important part of reproduction for some plants.

Deer also serve as an important food source for secondary and tertiary consumers such as wolves and coyotes. These apex predators depend on herbivores like deer to sustain themselves and their young.

**IUCN STATUS:**

**Status:** - Near Threatened



**Conclusion:**

We should not kill our white tailed deer just because they have fresh meat. They also have nice fur. We shouldn't kill them because the bucks have antlers. Maybe if we stop killing them they will love us.

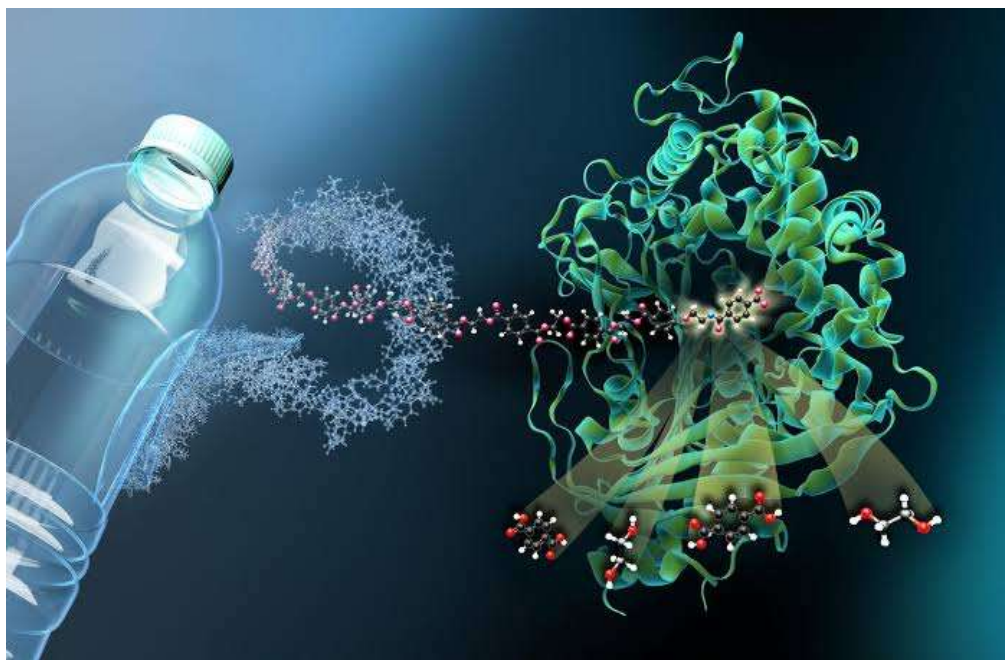
## MICROBIAL DEGRADATION OF PLASTICS

### SUSTAINABLE APPROACH TO TACKLING ENVIRONMENTAL THREATS FACING BIG CITIES OF THE FUTURE

ESHITA GHOSH, SEM II

#### Plastic degradation by bacteria and fungi

There were various reports available on polytene degradation by microbe (Table. 1). Aswale and Ade (2008) reported the biodegradation of carry bags. Bacterial isolates from the dumping areas was used and tested for the characterization of tensile strength, surface corrosion, percentage of weight are the parameters analysed. The sample exposed under the experimental condition for three months with regular shivering of the polythene discs showed surface corrosion, reduction in tensile strength, and a maximum rate of 12.5% of weight loss by *Pseudomonas sp.* And *Bacillus cereus* were the two strains identified using biochemical tests and morphological keys, actively involved in this degradation experiment. Biodegradation of degradable plastic polyethylene by fungi *Phanerochaete* and bacteria *Streptomyces* species have been reported by Lee et al., 1991. The methods used for testing plastic degradation are molecular weight distribution, weight loss, change in tensile strength and changes in percentage of elongation. The type of microorganism used was lignocellulose degrading fungal and bacterial strains. The fungi *Phanerochaete chrysosporium* and bacterial strains including *Streptomyces*, *S. Setonii* 75Vi2 and *Viridosporus* T7A, *S.Badius* 252 actively degraded the test sample with 50% reduction in tensile strength. The initial test sample contained 6% starch and pro-oxidant, which facilitated the degradation process.



**Table 1. Microbial degradation of polyethene:**

Sl. No.	Polythene Tested	Parameters checked	Microbes/ enzymes used for degradation	References
1.	Carry bags	Tensile strength, surface corrosion, weight percentage	<i>Pseudomonas sp; Bacillus cereus</i>	Aswale and Ade, 2008
2.	Biodegradable plastic with starch and pro-oxidant	Molecular weight distribution, weight loss, tensile strength, elongation percentage	<i>Streptomyces; Phanerochaete chrysosporium; S. Setonii 75Vi2; Viridosporus T7A; S. Badius 252,</i>	Lee et al., 1991
3.	Plastic cups and polythene bags	Loss of weight	<i>Pseudomonas; A.nidulance; B.subtilis; P.vulgaris; S.aureus; A.niger; S.lactis; A.glaucus; A.flavus; Penicillium; M. Luteus</i>	Priyanka and Archana, 2011
4.	Branched low density polyethylene	Gravimetric and molecular weight loss	<i>B.borstelensis strain 707</i>	Hadad et al., 2005
5.	Powdered form of low density polyethylene	Sturm test and SEM analysis.	<i>Aspergillus sp; Aspergillus versicolor</i>	Pramila and Vijaya Ramesh, 2011
6.	Low density polythene films	Weight measurements, Tensile strength, SEM, FTIR, GC-MS	<i>P.aeruginosa; P.putida; P.syringae</i>	Kyaw et al., 2012
7.	Linear low density polyethylene torque blended using starch	SEM, DSC, TGA, FTIR spectroscopy, loss in weight.	<i>P.funiculosum; G.virens; P.pullulans; A.niger; C.globosum</i>	Gilan et al., 2004
8.	HDPE and LDPE	Average heaviness	<i>Listeria; Bacillus; Micrococcus; Vibrio</i>	Kumar et al., 2007
9.	Disposable plastic films	Tensile strength, Percentage of elongation and Average weight loss	<i>M. rouxii NRRL 1835; Streptomyces strains; Aspergillus flavus</i>	El-Shafei et al., 1998

## **PAKHIBITAN**

**SOUMYAJIT TALUKDAR, SEM VI**



Last month on a whim, I visited Eco Park with my friends for birding. There I found a hidden gem known as Pakhibitan which is located near the gate 4 of Eco Park. This place is a natural marshland with a size of approximately 3 acres with an adjacent pond full of aquatic life. This place is a sanctuary for birds as well as other animals who call this place home. This place is being maintained by a nature group known as Nature Mates whose main objective is to promote nature conservation and proper education to common people about natural ecosystem around them. Also mention should be made of WBHIDCO who provided this land for this noble cause. This place is basically a natural ecosystem imitating the areas of East Calcutta wetlands of Rajarhat which is being destroyed day by day due to land encroachments. These sanctuary provides chance to observe nature as well as to research upon it.

This place attracts many people like nature enthusiasts as well as researchers who love the ecosystem of this place. We were able to spot and observe many different species thanks to our guide Mr Tarak Samanta who had such a huge amount of knowledge about this place and its ecosystem. For the facilitation of observation a wooden deck like structure is been made with a shelter at the rear end which provides great view of the area. The shelter acts as a watch tower as well as a collection room for collection of feathers nests photographs of many birds as well as other animals found near the region. One special thing about this place is most of the place is restricted and untouched which provides safe haven for animals to thrive in. The area around this place is divided into two segments a marshland area and a waterbody area. In the marsh land area we found many species of birds like Shikra, Spotted owl, Plainprinia, Blue throated barbet, etc. as well as Indian golden jackal, mongoose and oriental garden lizards and many more animals. Next in the aquatic area which is mainly for purpose of breeding of native turtles as well as native fishes like Badis, catfishes, etc. and many water birds like moorhen, white breasted water hen, etc. One of the most memorable moment was the sighting of Indian paradise

flycatcher which is a resident bird but quite uncommon. There is also grassland just behind water body which provides shelter for Indian golden jackal family and mongoose family.



Siberian Rubythroat

This place also acts as a safe haven for migratory birds like Siberian Rubythroat, Thick Billed Warbler, etc. as well as breeding ground for resident birds like Prinias, Common tailor bird, etc. Not only birds and animals this place is a haven for insects like dragonflies, damselflies, water striders notable species like Coromondal marsh dart, Plain tiger butterfly etc. Adjacent to this place there is a butterfly garden which also acts as a breeding and research project.

The sheer amount of biodiversity in this place is astonishing. This place is also full of native plants like Monkey jack tree, sacredtree, different types of reed plants, etc. which are very rare in the city area. All the habitats like grassland, marshland and the aquatic ecosystem are all in a sync in this place which shows the interaction of abiotic and biotic components in nature. This place is a great attraction for nature lovers who wants to spend their time in midst nature. This type of eco system just on the outskirts of the city in fascinating and it show how we can easily coexist with nature with very little effort. On the end note I would really to visit this place again and study more about this ecosystem. Thanking all the members of Nature Mates for their efforts in creating this paradise amidst the jungle of concretes. As we know –

'If you truly love nature you will find beauty everywhere' --

Vincent Van Gogh



Indian golden jackal.



Yellow bellied prinia

Picture credit by Mr Tarak Samanta. Information credit to Mr Tarak Samanta, Nature Mates – Nature Club Special mention – WBHIDCO



## **BIOSPHERE RESERVES OF INDIA: ISSUES OF CONSERVATION AND CONFLICT**

DEBTANU PODDAR, SEM VI

The relationship between humans and nature has changed dramatically over the last 10,000 years. Ever-increasing human population requires increasing manipulation of the natural world to make food production efficient enough to feed so many people. The increasing need to control nature to provide food, combined with the increasing disconnection between humans and the natural world in daily life, is reflected in views towards nature and religion as society becomes more complex. It has now been realised that an environment, which is rich in biological diversity, offers the broadest array of options for sustainable human welfare and for adaptation to change.

The concept of protected areas (PAs) for the conservation of wild species of fauna and flora has changed drastically since the establishment of the Yellowstone National Park in the United States of America in 1872. It was the world's first national park. Here and in other areas, wildlife was protected against people. Central to this concept was the approach of non-interference, and public access to enjoy nature. It has been subsequently realised that in most parts of the world (particularly in the developing countries), PAs are neither completely insular nor isolated pieces of habitat. They have human habitation inside them that continues to eke out a living from these areas. All the more it was realised that the 'hands off' concept is not uniformly applicable and in many parts of the world, it has not worked.

The Ministry of Environment and Forest, Government of India launched the Biosphere Reserve (BR) Programme in 1986. The specific objectives of this Programme are:

1. To conserve the diversity and integrity of plants and animals within the natural ecosystem;
2. To safeguard the genetic diversity of species on which their continuing evolution depends;
3. To provide areas for multi-faceted research and monitoring;
4. To provide facilities for research and training;
5. To ensure the sustainable use of natural resources through most appropriate technology for improvement of economy and living standard of local people.

Presently, there are 18 BRs in India. These are like Nilgiri, Gulf of Mannar, Nanda Devi, Sundarban, Similipal, Pachmarhi, Nokrek etc.

In the context of India, human population living within the BRs has always been a matter of conflicting interests and debate. It is so because the BRs of India are also the abode of many traditional societies that have always been an integral part of the ecosystem functioning there, living close to the nature. Living in the areas rich in natural resource, traditional societies fulfil many of their livelihood requirements from rich biodiversity around them. The flexibility and creativity in the BR's concept need to be seen from the point of view of both biodiversity as well as the population diversity. The benefits of population diversity at societal level are comparable

to those accruing from the biodiversity. It is important to allude that while the issues of biodiversity have been addressed at length and caught attention widely, the cultural diversity has not been touched upon and left to the point of oblivion. In the majority of the Indian BRs, the focus is still on providing local people with alternative sources of livelihood so as to reduce pressure from these areas, and many of these areas have within them the eco-development projects that are facilitating this. However, very few are actually looking at how to ‘sustainably use’ the resources of the area and thereby, allow for the local people to have a stake in the management, research and monitoring, and protection of the area in question. Over the past few years, the Joint Forest Management (JFM) programme in India has progressed beyond simply meeting the subsistence needs of local communities, to contributing to income generation and improvement of livelihoods, but this is only a spin off, and not a focused approach. What is needed is a biodiversity-based approach wherein people are assured of economic and other returns which, in turn, may provide local communities the right incentive for protection of biodiversity existing in BRs.

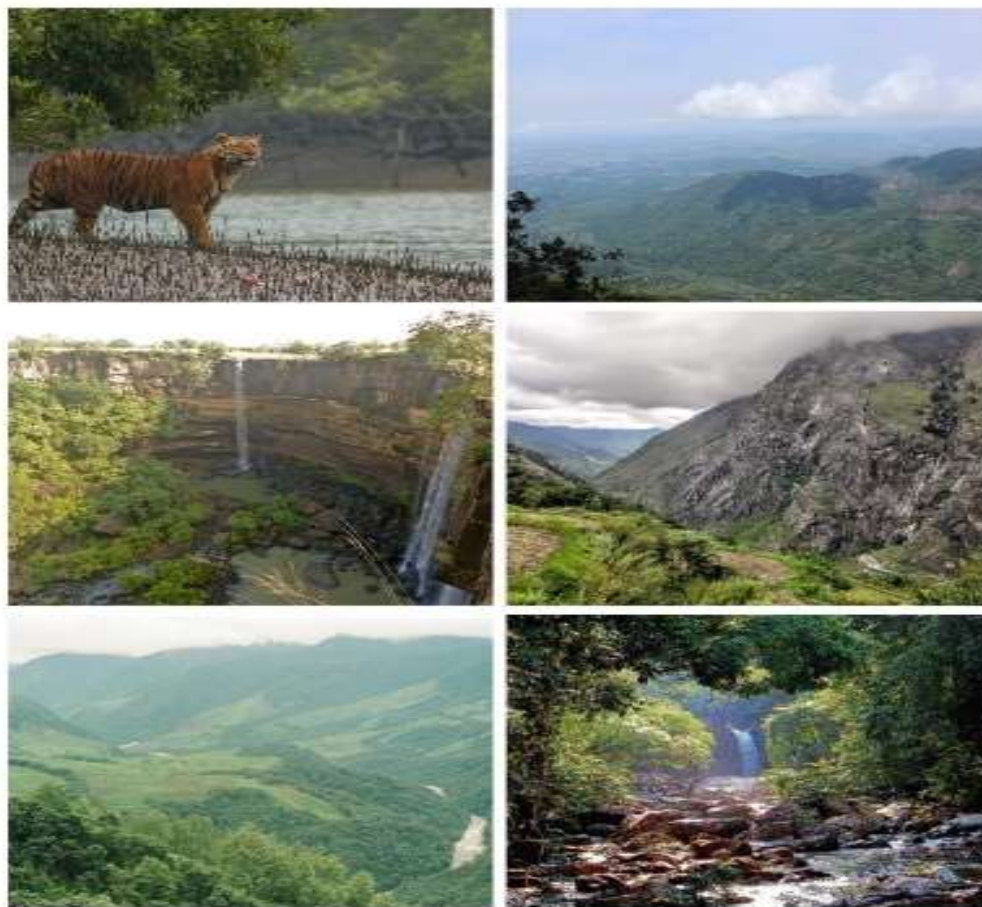


FIG: DIFFERENT BIOSPHERE RESERVES OF INDIA

The BR management, therefore, necessitates understanding of not only the ecological issues but also the socio-economic and cultural issues linked with the former. Understanding societal perceptions of natural resources as a cultural resource—often seen through the conceptual framework of sacred species, sacred groves, sacred water bodies, sacred landscape or even sacred mountain system— and integrating it in the management strategy is necessary for the success of the Biosphere Reserve programme. In order to achieve this, conservation-linked development strategy has to be based on a value system that people can understand, appreciate and accept it, in turn, requires appropriate institutional arrangements for peoples’ participation, through a ‘bottom-up approach’, ensuring that each household takes part in the decision-making process at the lowest level in the hierarchy keeping into consideration the gender sensitivities.

## **BUTTERFLIES**

MOMO NASKAR, SEM IV

### **SYSTEMATIC POSITION:**

**KINGDOM: ANIMALIA**

**PHYLUM: ARTHROPODA**

**CLASS: INSECTA**

**SPECIMEN: *Rhopalocera* sp.**



Among all insects and bugs, the butterflies are very colorful and noticeable. One of the most beautiful winged insects is a butterfly. In the day light, we can easily find them in the gardens and forests. Butterflies found everywhere except Antarctica. There are millions of species or types of butterflies can found. The various species of butterflies own different colored wings. They are generally creatures who are cold-blooded. At a speed of 10km to 22km per hour, butterflies can fly. They are conspicuous and fluttering flight. As like

more insects they under grow complete metamorphosis. Butterflies are often polymorphic, and many species make use of camouflage, mimicry and aposematism to evade their predators.

**“BUTTERFLIES ARE CERTAINLY ONE OF THE MOST APPEALING CREATURES IN NATURE”.**

Butterflies are plays important role in ecosystem. As population of butterflies diminish, so will population of birds and other animals that rely on them as a food source. That will continue to affect the entire ecosystem.

## **BIRDS OF DEATH: TOUCHING THESE BIRDS CAN KILL YOU**

SRIJA BANIK, SEM IV

In the heart of one of Earth's most pristine rainforests, researchers have made a startling discovery: more species of poisonous birds. These rare creatures, found in the jungles of New Guinea, have long been a source of fascination for scientists and the public alike.

The researchers identified the regent whistler (*Archencephala schlegelii*) and the rufous-naped bellbird (*Aleadryas rufinucha*) as the newly discovered poisonous species. The regent whistler belongs to a family of birds known for their widespread distribution and distinctive songs, which can be heard throughout the Indo-Pacific region.

The toxin present in the birds' bodies and plumage, called Batrachotoxin, is incredibly powerful and can cause muscle cramps and cardiac arrest upon contact.

This discovery has really led to a major setback in the field of zoology.



A picture showing one of the above mentioned species

## SOME INCREDIBLE SEA STAR SPECIES

SANGITA MONDAL, SEM II



Sunflower Star Fish (*Pycnopodia helianthoides*)

Order - Forcipulatida  
Phylum - Echinodermata  
Family - Asteroidea

Sunflower star fish is a large sea star found in the northeastern Pacific Ocean. The only species of its genus, it is among the largest sea stars in the world, with a maximum arm span of 1m.

Order - Forcipulatida  
Phylum - Echinodermata  
Family - Asteroidea

The Necklace star fish is found in the Indo-West Pacific region, growing up to 7cm in length. Found singly or in constellations, on rubble and sandy areas of shallow rocky slopes and reefs.



Necklace Star Fish (*Formia monilis*)



Choriaster Star Fish (*Choriaster granulatus*)

Order - Valvulida  
Phylum - Echinodermata  
Family - Oreasteridae

The Choriaster star fish is a large sea star with a convex body and five short arms. This species is harmless to humans.



Crown Of Thorns (*Acanthaster planci*)

Order - Valvatida  
Phylum - Echinodermata  
Family - Acanthasteridae

The Crown Of Thorns Starfish or COTS, is one of the largest types of starfish in the world. Reaching lengths of nearly 1m, these precarious sea stars are covered in hair raising spikes which are venomous to marine creatures and humans.

Order - Valvatida  
Phylum - Echinodermata  
Family - Oreasteridea

Chocolate chip sea star is a species of sea star found in the warm, shallow waters of the Indo-Pacific region. They are sometimes seen in the marine aquarium trade or dried and sold as curios.



Chocolate Chip Star Fish (*Protoreaster nodosus*)

## KILL POLLUTION OR IT WILL KILL US

BIDISHA PAL, SEM II

**DEFINITION OF ENVIRONMENT-** The word “environment” is derived from the French word “environner”, which means “to encircle” or to surround. There are too many ways to define about environment but the most suitable definition is “all living and nonliving factors affecting an organism and ultimately determining its form and survival known as environment.”

**Definition of biosphere-** The part of earth’s surface and atmosphere in which plants and animals can live.



### RELATION BETWEEN ENVIRONMENT AND BIOSPHERE:

The biosphere is actually an environment that contains all living organisms and the products of their activities.

### TYPES AND REASONS OF ENVIRONMENTAL POLLUTION-

**AIR POLLUTION-**A mixture of various solid particles and gases in the air like  $\text{CO}_2$ ,  $\text{NO}_2$ ,  $\text{SO}_2$  etc. cause adverse changes in the atmosphere. The sources are-Vehicle Emission, Construction, and Waste burning.

### PREVENTION OF AIR POLLUTION-

- Use public transports.
- Using alternate sources of energy and reduce use of fossil fuels.
- Afforestation.





**WATER POLLUTION-** Contamination of water bodies due to human activities cause water pollution. The sources are sewage, agricultural pollution and waste dumping in the river

**PREVENTION OF WATER POLLUTION-**

- Dispose of toxic chemicals properly
- Use phosphate free detergent
- Awareness of water pollution should be spread



**SOIL POLLUTION-** Presence of toxic chemicals in soil, in high enough concentrations to pose a risk to human health and the ecosystem. The major sources are mining, agriculture and waste dumping.

**PREVENTION OF SOIL POLLUTION-**

- Eat sustainable foodstuffs, properly recycle batteries, produce homemade compost and dispose of drugs in places authorized for this purpose.
- Encourage a more eco-friendly model for industry, farming and stock breeding, among other economic activities.
- A proper method of waste management should be applied.



**SOUND POLLUTION-** Maximum sound pollutions occurs due to horns of millions of vehicles on road and extensive use of microphone and sound box during occasions.

**PREVENTION OF SOUND POLLUTION-**

- Horns in public places such as hospitals and educational institutions should be banned.
- Strict law should be applied in case of extensive harmful noise above 65decibels.

**CONCLUSION-** Environmental pollution directly leads to extinction of biodiversity in biosphere. So in case of save the biosphere we must control the environmental pollution. The most effective way to save the environment from pollution is to create mass awareness about all types of pollutions and apply proper preventives.

## **INTERESTING FACTS OF ZOOLOGY**

**SAKSHI PANDIT, SEM II**

- There are more chickens than people in the world.
- An ostrich's eye is bigger than its brain.
- There are more than 1.4 billion insects for EACH HUMAN on the planet, according to recent estimates.
- Every dog has a unique nose print with no two alike.
- A dog's sense of smell is 1000 times greater than a human!
- Cats can taste the air. That lip curl your cat makes after sniffing something actually has a name — the flehmen response — and it means he's using his tongue to trap the pheromones and flick them to an organ above the roof of his mouth to process them.
- The loudest animal in the world is a mere 2cm long, prawn. The Pistol Shrimp is capable of snapping its claw shut so rapidly, that it creates a bubble which collapses to produce a sonic blast, louder than a Concorde's sonic boom. The shock wave can reach 230 decibels, also louder than the sound of a gunshot.
- Flamingos are not pink. They are born grey, their diet of brine shrimp and blue green algae contains a natural pink dye called canthaxanthin that makes their feathers pink. Flamingos in zoos often lose their colouring, until zoo keepers supplemented their diets.
- Otters "hold hands" while sleeping, so they don't float away from each other.
- Dolphins use toxic pufferfish to 'get high'. Dolphins deliberately handle pufferfish causing them to release toxins as a defence mechanism. These toxins can be deadly in high doses, but also have a narcotic effect – and are a powerful hallucinogenic, which dolphins appear to enjoy.
- The horned lizard is able to shoot blood from its own eyes, up to a distance of 3 feet away. The rather bizarre and disgusting act is a defensive mechanism to confuse predators. Their blood contains a chemical that is noxious to predators. Short-horned lizards are also capable of inflating their bodies up to twice their size to scare anything away.
- A group of parrots is known as a pandemonium.
- Even after having its head cut off, a cockroach can still live for weeks. Even stranger, a cockroach's head can actually survive by itself for a few hours, too.
- A common garden snail has 14,000 teeth. Their microscopic teeth are called radula, and some species actually have over 20,000 teeth.
- The Giant Pacific Octopus has 3 hearts, 9 brains and blue blood. They are also able to change their colour and texture to camouflage themselves in a blink of an eye.
- The male seahorse goes through pregnancy and gives birth to babies. They are the only animal on earth where the male carries the baby rather than the female. The male seahorse has a pouch on its stomach in which to carry babies, as many as 2,000 at a time.
- Pufferfish contains tetrodotoxin, a toxin that is up to 1,200 times more deadly than cyanide to humans. There is enough toxin in one pufferfish to kill 30 adult humans, and there is no known antidote.
- More than half of all pigs in the world are kept by farmers in China.

- Polar bears have jet black skin under their white fur coats. It helps them absorb heat to keep warm, while the white fur helps provides camouflage in the snowy and icy environment they live.
- An ostrich legs are so powerful that their kicks can kill a lion.
- Great white sharks can detect a drop of blood in 25 gallons (100 litres) of water and can even sense tiny amounts of blood from 3 miles (5 km) away. They use their acute sense of smell to detect blood using an organ called the 'olfactory bulb'.
- Elephants can be right- or left-trunked. It's like how you might be right- or left-handed! Basically this means elephants prefer to use one side of their trunk. They start to develop this preference at around 3 months old.
- Koalas have fingerprints almost identical to humans. There are even reported cases of a koala's fingerprints confusing forensics at crime scenes.
- A Rhinoceros's horns are made of 'keratin', the same type of protein that makes up hair and fingernails.
- The most venomous fish in the world is the 30cm Stonefish.
- Only 5% of cheetah cubs survive to adulthood.
- The box jellyfish is considered the most venomous marine species in the world. These cube shaped jellyfish have long tentacles and can be over 3m in length. Their toxin, delivered via stinging cells in their tentacles is so potent that many die before they can even reach the shore.
- Duck-billed platypus don't have nipples, instead they concentrate milk to their belly and feed their young by sweating it out.
- Lungfish are the only fish that have both lungs and gills. This allows them to survive when the water in their ponds/lakes dries up.
- The yellow headjewfish incubates its eggs in its mouth. The male gathers up all of the eggs once they've been fertilised and stores them in his mouth until they hatch.
- Horned lizards shoot blood out of their eyes to scare off predators, this lizard shoots blood out of its eyes.
- Elephants mourn their dead. Elephants will return to the place where family members died and stand in silence over the bones, sometimes bowing their heads.
- The little known pangolin is the worlds most poached and trafficked animal. This is due to the high demand of their scales and meat in Asian cultures.
- There are an estimated 8.7 million species on earth and more than 80% of them are undiscovered.

# **BIOSPHERE IN DANGER**

SANGITA MAITY, SEM II

## 1) Pollution and waste management :-

Water quality in rivers and streams that flow into the marine environment. Impacts of climate change (storm surge, coastal inundation and erosion; inland flooding; increased fire risk; threats to human health, water supplies and infrastructure; and pressure on biodiversity.

## 2) Changes in land and sea :-

Large swathes of the United States' great prairies continue to be converted into cropland, according to the research, to make way for soya bean, corn and wheat farming. Changes in land and sea use has been identified as the main driver of "unprecedented" biodiversity and ecosystem change over the past 50 years. Three-quarters of the land-based environment and about 66% of the marine environment have been significantly altered by human actions.

## 3) The climate changes :-

Until now, the destruction of habitats and extraction of resources has had a more significant impact on biodiversity than the climate crisis. This is likely to change over the coming decades as the climate crisis dismantles ecosystems in unpredictable and dramatic ways, according to a review paper published by the Royal Society.

## 4) Population:-

On the west coast of Scotland, fragments of an ancient rainforest that once stretched along the Atlantic coast of Britain cling on. Its rare mosses, lichens and fungi are perfectly suited to the mild temperatures and steady supply of rainfall, covering the crags, gorges and bark of native woodland. But nitrogen pollution, an invisible menace, threatens the survival of the remaining 30,000 hectares (74,000 acres) of Scottish rainforest, along with invasive rhododendron, conifer plantations and deer.

## ZERO POINT

SAGORIKA DAS, SEM II



A perfect destination for high-altitude excursions, Yumesamdong or Zero-point Sikkim stands at an altitude of 15,300 feet above mean sea level and offers beautiful sightseeing opportunities. It is the last outpost of civilization and there is no road ahead. Owing to a higher altitude, oxygen levels there are pretty low. The beautiful confluence of three rivers, surrounding snow-clad mountains, and marvelous scenic views make Zero Point Sikkim one of the best places to visit in India.

While the roads are quite treacherous, Zero Point or Yumesamdong is one of Sikkim's prime tourist attractions.

The sight of the yaks grazing in the snow is a pleasant one. You will be completely smitten by the surrounding natural beauty.



## **EARTH'S SPHERE**

**PUSKAR BAGANI, SEM II**

The biosphere is the part of the earth where living things exist. It encompasses all living things living in the lithosphere, atmosphere, and hydrosphere. There are also artificial biospheres that have been made mainly for research and investigation, such as Biosphere 2, which is by far the largest closed ecology system ever built by mankind

### **The desert biome**

The desert biome is characterized by readily available, highly concentrated solar energy, but has sparsely available water. The hot, "desolate" desert biome is home to many forms of life - plants, animals, and microorganisms that have developed specializations preventing them from losing water, enabling them to store it, and providing them with mechanisms for controlling their body temperatures. Deserts cover about a fifth of the world's continental areas. Drylands are characterized by aridity, as shown by their thin natural vegetation and their limited usefulness to farmers raising field crops. International organizations generally divide dry regions into four categories: hyper-arid, arid, semi-arid, and dry sub-humid. These levels are defined quantitatively according to their average annual precipitation or an aridity index, the latter factor including not only the positive contribution of precipitation but also water losses due to evaporation and transpiration (evapotranspiration). Thus, for example, a hyper-arid region will have an annual precipitation range between 0 and 50 mm. or an aridity index between 0 and 0.3.



# Photography





**Garden lizard** of the family Agamidae, remarkable for their extreme colour changes when excited...



The **little egret** is a species of small white heron with attractive white plumes on crest, back and chest, black legs and bills, yellow feet...





## Red Crab

**Red crabs** are famous for their bright red colour and for their spectacular annual migration to the sea...



## Ghost Crab

**Ghost crabs** are common shore crab. The name “ghost crab” derives from their nocturnality and their general colouration. They are also called sand crab...

# *Rhesus macaque*

SOUMYAJIT TALUKDER, SEM IV



**Photographed in Rishikesh , Uttarakhand**

**The most common of apes species found all over north and central India. Used in many scientific research due similarities with human genome. They most feed on roots, fruits, seeds, small invertebrates, and eggs of birds.**

# TERMITES HOUSE

TIYASHA DUTTA, SEM VI



A termite colony is a highly organized social structure consisting of thousands to millions of termites working together. It comprises different castes with specific roles, such as reproductive individuals, workers, and soldiers. The colony constructs complex nests for protection and communication, often made of soil, wood particles, saliva, and faeces.

# PLACES IN LADAKH

PARBANI CHAKRAVARTI, SEM II



**PANGONG LAKE: Word's Highest Salt Lake**



**SANGAM: The confluence point of the Indus and Zaskar Rivers**

# ZEBRA FINCH

PAYEL DAS, SEM IV



Zebra finches are small, colorful songbirds that have been favored by bird fanciers since the nineteenth century.

**Kingdom:** Animalia

**Phylum:** Chordata

**Class:** Aves

**Order:** Passeriformes

**Genus:** *Taeniopygia*

**Species :** *castanotis*

**Common Name :** Zebra Finch

# PEACOCK

SAYANTAN MONDAL, SEM II



The Indian peacock has iridescent blue and green plumage, mostly metallic blue and green. In both species, females are a little smaller than males in terms of weight and wingspan, but males are significantly longer due to the "tail", also known as a "train". The peacock train consists not of tail quill feathers, but highly elongated upper tail coverts. These feathers are marked with eyespots, best seen when a peacock fans his tail. All species have a crest atop the head. The Indian peahen has a mixture of dull grey, brown, and green in her plumage. The female also displays her plumage to ward off female competition or signal danger to her younger ones.

Scientific Name: *Pavo sp*

# SPOTTED OWLET

SOUMYAJIT TALUKDER, SEM VI



**Spotted owlet is one of the common species of owl found all over India. They feed mostly on insects and small invertebrates. They mostly roost in the cavity of trees.**

# DRAGONFLY

SAKSHI PANDIT, SEM II



**Dragonflies are small insects belonging to the infraorder Anisoptera below the order Odonata. They live mainly in wetlands and close to water. They are found in various colours like yellow, red, blue, black and orange. They generally feed on mosquitoes, flies and bees. More than 5000 species of dragonflies are found. They serve as food source to a variety of fishes and birds. They are found in all continents with the exception of Antarctica.**





# **STUDENT'S ACTIVITY**



# TEACHERS' DAY CELEBRATION



# FRESHER'S WELCOME CELEBRATION



# EXCURSION TO DARINGBARI, GOPALPUR



# LOCAL EXCURSION TO POULTRY MELA



# CONVOCATION OF COLLEGE TOPPERS



## TOPPER OF THE COLLEGE

**2022-23 : Abhilasha Ganguly, persuing Msc in University Of Calcutta**

**2021-22 : Sarthak Basu, persuing Msc in University Of Calcutta**

**2020-21 : Aniruddha Dey, Post-Graduate from University Of Calcutta and engaged in philanthropic work (Uran Welfare Society)**

# LOCAL EXCURSION TO INDIAN MUSEUM



# FAREWELL OF OUR PROFESSOR PRADIP KUMAR PAHARI SIR

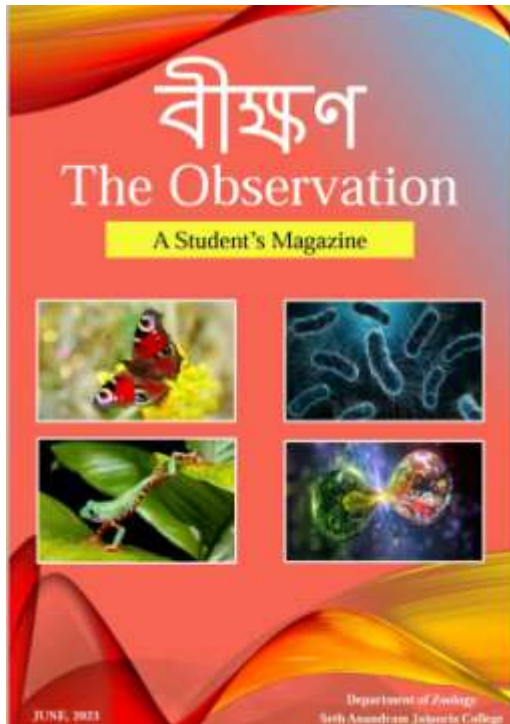




# SEMINAR AND PARENTS TEACHER MEETING



# SPECIAL MENTIONS FOR PRESENTATION OF FRONT COVERS



**SOUMYA MITRA, SEM II**



**SAYANTAN MONDAL, SEM II**

## Highlights

### What Really Killed Dinosaurs

Was it the impact of an enormous asteroid, or did nest marauding mammals end the dinosaurs reign? It's likely that the cretaceous period ended not with a bang but with a whisper most likely from all male or female choruses of dinosaurs.

### Different Star Fish Species

Starfishes are wonderful to look at and we all have been fascinated by it. But do you know the several species of star fishes and how different they look?

### Birds of death

Did you ever wonder if just touching a bird can KILL YOU!? The toxin present in the birds' bodies and plumage, called Batrachotoxin, is incredibly powerful and can cause muscle cramps and cardiac arrest upon contact.

### Red Data Book

Killing animals and using them for decorating houses, feeding ourself and what not. To fulfill our greed and needs we are directly or indirectly affecting the biodiversity leading to the extinction of several species. Take a look at the number of extinct and endangered species,

### Pakhibitan

We all visit places every now and then but do you know about this gem, not so far to visit? With different species of birds residing here, this place is a treasure for all the bird lovers.

