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STUDENTS' PRESENTATIONS

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THE DEPARTMENT OF ZOOLOGY,
NARASINHA DUTT COLLEGE, HOWRAH**

ENVIRONMENTAL THREATS TO SURVIVAL AND CONSERVATION OF TIGERS



Presented by Ananya Ray, Mayesha Tasnim and Trisha Bandhu, Department of Zoology, 6 th Semester

Threats

There are 9 subspecies of tiger and by IUCN red list 3 subspecies of tiger is extinct.

*In the past century, **97 percent** of the world's tiger population has vanished, leaving only about 3,900 individuals left in the wild in 2017. Along with **Poaching and Illegal trafficking**, a new threat looms for these remaining tigers: **climate change**.*



1. Temperature changes

Shifting temperatures are altering habitat for Siberian tigers in Russia and China, as **Korean pine forests give way to fir and spruce trees** — meaning less prey for hungry tigers that hunt in pine forests. Fewer than **600 Siberian, or Amur, tigers remain**, heralding the **possible extinction** of the world's largest cat within the next 100 years.



2. Natural disasters

As climate change accelerates, wildfires are **becoming more frequent** in ecosystems that do not typically experience a fire season, including temperate forests in Siberia. Longer, hotter and drier wildfire seasons are the new reality, threatening Siberian tiger habitat and food supplies. Climate change also drives more intense storms and **flooding that destroys crops**, forcing people to travel farther from their homes and into tiger habitats to make a living. In the Sundarban Islands, human-tiger conflict can result as displaced farmers gather seafood and honey in the same mangroves where tigers roam.

3. Human-wildlife conflict:

The growth of human populations and land use has inevitably forced humans and tigers into closer proximity, competing for shrinking habitats. Tigers have fewer prey available and are forced to kill livestock in order to survive, resulting in retaliatory killings from farmers and communities.



Only 7% of the tiger's historical range is intact today and tiger habitats are left in isolated areas. This results in small pockets of tiger habitat surrounded by human populations. Not only can this result in human/tiger conflicts as tigers roam to find new habitats, but it can also result in inbreeding in small populations which can reduce genetic diversity. According to the IUCN's Red List, habitat loss is now the main threat to 85% of all species.



TIGER CONSERVATION

- ▶ Tiger has been the integral part to the life and legend on mankind. Project Tiger is a tiger conservation programme launched in April 1973 by the Government of India during Prime Minister Indira Gandhi's tenure.
- ▶ As the Bengal Tiger is the national animal of India, this project aims to stem the dwindling population of the big cats and work to increase their numbers.

WHY SHOULD WE SAVE TIGER?

- ❑ Tiger play pivotal role in the health of the ecosystem.
- ❑ Tigers constitute the top carnivores in the ecosystem and is at the apex of the food chain.
- ❑ The removal of a top carnivore from an ecosystem can have an impact on the relative abundance of herbivore species within a guild.



HOW ENDANGERED ARE TIGERS

Conservation efforts in recent years mean that tiger numbers are on the rise, but they are certainly not out of the woods yet.

Current tiger populations are extremely difficult to calculate as their habitat is so fragmented, but the cats are classified as endangered.

The conservation of tigers is not just about increasing their numbers as more tigers require more habitat, which is becoming less and less available each day. It is important that tiger populations stop dwindling, and habitat stops being lost.



Conservation process

- ▶ Conservation of tiger (or any other wildlife) requires the following knowledge :-
- ▶ The natural habitat of tiger and its food habit.
- ▶ About the breeding habit and breeding season of tigers.
- ▶ Its relation with other animals.
- ▶ The number of animals present at any given time; reasons for their diminishing or increasing.
- ▶ Places of drinking water and its of arrangement.
- ▶ Places of cover and shelter for tigers
- ▶ Enactment of the laws for their protection.



Objectives

Project Tiger's main aims are :

Reduce factors that lead to the depletion of tiger habitats and to mitigate them by suitable management. The damages done to the habitat shall be rectified to facilitate the recovery of the ecosystem to the maximum possible extent.

Ensure a viable tiger population for economic, scientific, cultural, aesthetic and ecological values.



TIGER CONSERVATION INITIATIVES

The first official estimation of the Indian tiger population was done in 1972. About 1,827 tigers were recorded in the wild. This led to the setting up of a task force under IBWL which ultimately led to the launching of 'Project Tiger' in 1973, beginning with nine sites in nine different states (Table 4.53) :

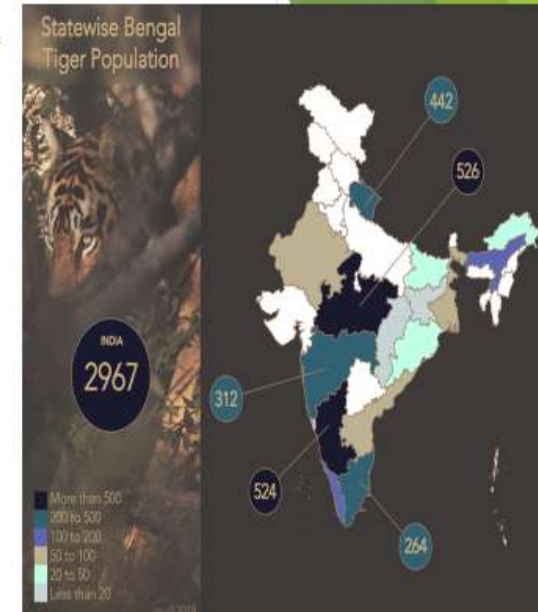
Table 4.53 : Tiger census report of 1976 and the initial nine sites under Project Tiger

Name of Tiger Reserve	Tigers
Sunderban (W.B.)	200
Manas (Assam)	41
Bandipur (Karnataka)	19
Kanha (M.P.)	51
Melghat (Maharashtra)	32
Ranthambhore (Rajasthan)	20
Palamou (Bihar)	20
Simlipal (Orissa)	15
Corbett National Park (U.P.)	35

MANAGEMENT

Project Tiger was administered by the National Tiger Conservation Authority. The overall administration of the project is monitored by a steering committee, which is headed by a director. A field director is appointed for each reserve, who is assisted by a group of field and technical personnel.

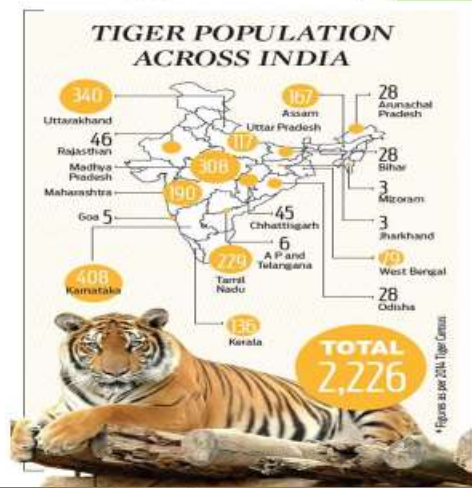
- Shivalik-Terai Conservation Unit
- North-East Conservation Unit
- Sunderbans Conservation Unit
- Western Ghats Conservation Unit
- Eastern Ghats Conservation Unit
- Central India Conservation Unit
- Sariska Conservation Unit
- Kaziranga Conservation Unit



Project tiger success

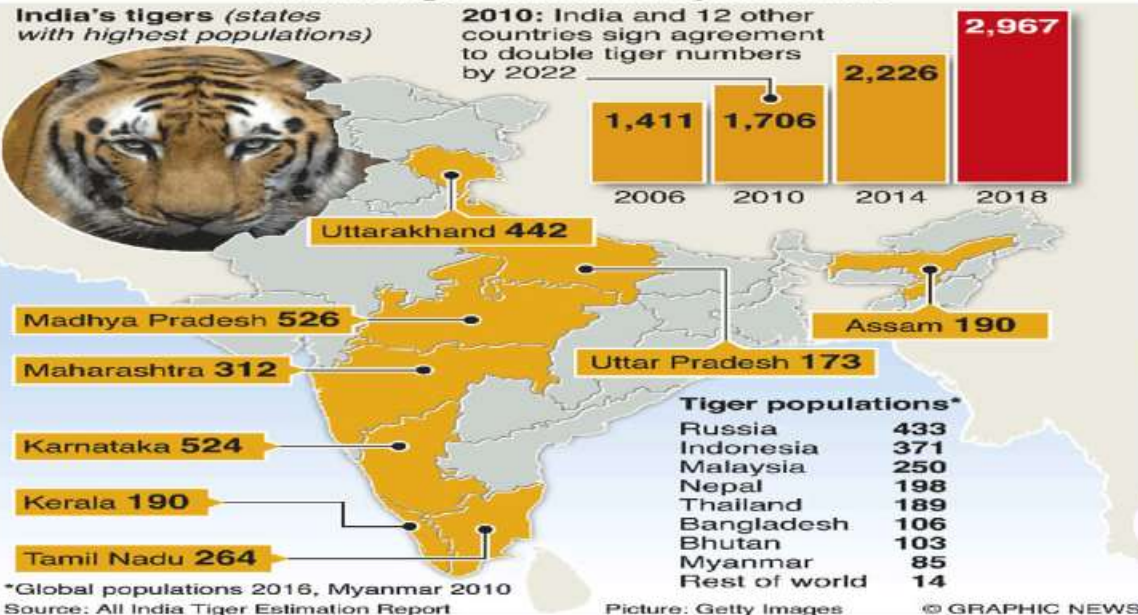
As a result of this programme and its efforts, the population of Bengal Tigers had increased from about 1200 in 1973 to an impressive 3 500+ in 2007.

Project Tiger has also established the Tiger Protection Force with the aim of catching poachers and stopping the killing. This initiative has been instrumental in relocating about 200 000 villagers in the rural areas so that they are no longer living within the natural habitat of the tigers. This reduces the risk of tiger attacks on humans.



India is home to 2,967 tigers

The total number of tigers in India stands at 2,967, or more than 70 percent of the wild tigers that inhabit the world, according to the All India Tiger Estimation Report for 2018



Conclusion

Project Tiger has been undertaken by more than fifty national parks, and every park is putting an equal effort to save the endangered species. Increasing four thousand tigers in the past few years is one of the landmark achievement of the project.



SUNDARBAN ECOSYSTEM RESTORATION WITH SPECIAL REFERENCE TO BIODIVERSITY CONSERVATION

Diti Mullick

Sangam Gayen

& Shreya Pramanick

SEM IV Department of Zoology

Narasinha Dutt College



Diti Mullick



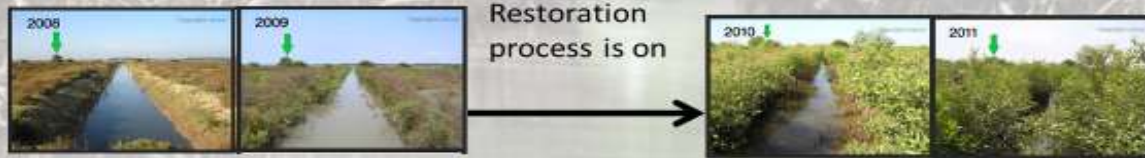
Sangam Gayen



Shreya Paramanick

What is Ecosystem Restoration?

Ecosystem Restoration is the process of assisting the recovery of an ecosystem that has been degraded, damaged or destroyed. Ecosystems are dynamic communities of plants, animals and microorganisms interacting with their physical environment as a functional unit.



Threats of Sundarban

1. Cyclonic effect :

From 1971 till today, Sundarban has faced many Cyclones such as Bhola, Sidr, Ayla, Bulbul, Phoni, Amphan and lastly Yaas. It has greatly damaged the mangrove forest. Thus, Costal West Bengal is now vulnerable for future Cyclone.



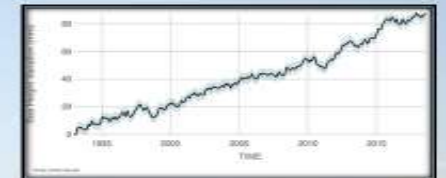
2. Saline Waterlogging

As a result of these cyclones Ocean saline water is entering into the paddy fields of Sundarban making them Barren.



3. Global Warming and rising of sea water:

The polar glaciers are melting gradually and thus chances of drowning of the islands of Sundarban and the traditional mangrove forests are losing day by day.



4. Deforestation and Poaching :

Local people cut the mangrove branches for their fuel purpose. This gradually has made the forest empty. Skin of Royal Bengal Tiger and Dear has a high market value. So, they are hunted enormously.



Restoration management

1. Plastic prohibition :

First of all, we have to give a special attention to stop the use of plastic. To stop the pollution plastic usage should be strictly prohibited by the local people and tourists. In this way, we will be able to restore the Sundarban a little bit.



2. Mangrove Plantation

Natural calamities, rising of sea level, soil erosion, deforestation - this types of problems are destroying the aesthetic beauty of Sundarban. But we still have time to save our mangrove forest. So, mangrove plantation should be increased by common people & NGOs with the help of Government. More plantation should be required on Dams also.



3. Salt-tolerant paddy

Due to saline water logging in the arable lands of Sundarban has been damaged by the cyclonic effect. In this crucial moment, we have to keep pace with the situation. As the soil becoming saline, salt-tolerant paddy should be introduced intricately.



4. Use of refined fuel in mechanised boat

Mechanised boat is a common watercraft in Sundarban. But somewhere this is a big problem to the rivers of Sundarban. As a result, fuel is being mixed in the water and causing damage at the end. So, to avoid and overcome such a great problem we need to use refined fuels instead of harmful fuels.



Acknowledgement

We would like to express our special regards to our respected Principal **Dr. Soma Bandhopadhyay** and our IQAC Coordinator **Dr. Kuntal Chattopadhyay**, to present our project on the auspicious day of World Environmental Day. And we have got a greater exposure to ecosystem itself.

We are also grateful to our respectable teachers in our **Department of Zoology** to give us the golden opportunity for presenting our PPT presentation and every moment we are encouraged and inspired by our classmates too. And especially we would like to express a very special gratitude to our **Prof. Subrata Kumar Basu Sir**, for his overall guidance and his continuous support and decision has helped us for the betterment of our presentation.

5. Stop cutting trees

Local people of Sundarban area is so much depending on bringing wood from the forest for fuel. But to save our nature we have to stop to cutting trees and hurt them. But not only they can use forest wood at all, I) they can break dry stalks II) cutting dead trees III) collect fallen woods. To prevent cutting trees, now CNG gas has been delivered to them for fuel by the help of Government.



6. Prawn culture and catching of prawn seeds should be done in a sustainable way.



7. Long term fish culture should be done in a sustainable way



8. Aesthetic beauty of Sundarban should be maintained.

Santragachi Jheel - Ecological Studies on Sustainable Restoration

Sayak Kumar Pal
Shreya Ghosh
Sourima Das

■ Ecosystem

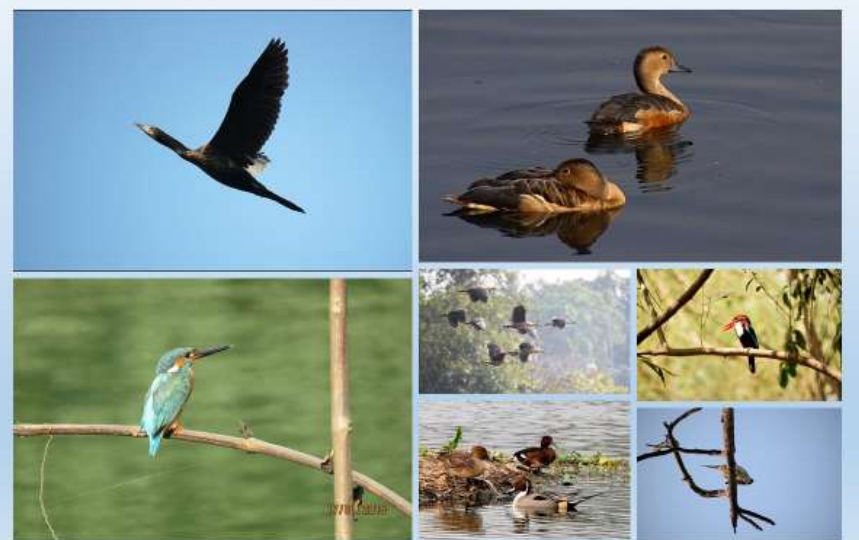
An **Ecosystem** is a community of living organisms in conjunction with the nonliving components of their environment, interacting as a system. These biotic and abiotic components are linked together through nutrient cycles and energy flows.

■ Ecological restoration

Ecological restoration is the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed, It is an intentional activity that initiates or accelerates an ecological pathway or trajectory through time-towards a reference state.



Various Birds seen at "Santragachi Jheel"



Present Situation

- There was total 6 active lakes, but now; 4 are properly active, one is partly active & left one is almost dead.
- Initially it was connected to "Mou khal" via small canal (situated at south-east portion, near the rail factory). Excess rainwater would pass through it to the Ganges; but now it is no more connected to mou khal as the canal is totally filled.
- It causes overflow of water in every rainy season as the excess water can't pass through the canal.
- Water depth is decreasing day by day.

Present Maintenance

- Now this area is maintained by (govt. authorities and NGOs);
 1. West Bengal Biodiversity Board
 2. Howrah Vigyan Chetna Samannya
 3. Nature Mates nature club
- Water hyacinth is maintained and kept up to an optimal quantity on lake. It's necessary to keep the water surface free and clean especially for migratory ducks.
- **Small floating islands** are made with water hyacinth on the lake for migratory birds.



Why it's essential to restore ?

- ✓ Santragachi lake performs as rainwater reservoir, which is very important.
- ✓ Aquatic fauna & flora would be lost permanently if restoration is not done .
- ✓ It will turn into a wetland forest step by step (lake → marshland → swamp → bog → forest)
- ✓ Migratory birds: This place is famous for the migratory birds. This helps in research and practical field works. If the restoration is not done, we will lose the chance to see those amazing migratory species which will be very unfortunate for us.

Water hyacinth – Threat & Cure

- Water hyacinth covers most of the lake surface. So, aerial O₂ can not dissolve in lake water.
- Hyacinth covering resists the entry of sunlight, which is a threat for this water ecosystem.
- As water hyacinth grows too fast, its removal is quite difficult, but it prevents algal bloom.
- Water hyacinth balances nutrient level of water by absorbing excess nutrient & heavy metals.
- It helps to reduce water overflow as its transpiration is much more than natural evaporation.



Temporary Islands of Water Hyacinth (presently made)

Revive Water Flow

- The Canal that's connected to mou khal should be cleared so that "Santragachi Jheel" can stay connected with it and water can pass.
- Thus water flow will be revived.
- Excess rainwater in lake, causes nutrition dilution. So, proper canal system can maintain the nutrient load as excess nutrient will be removed through canal.

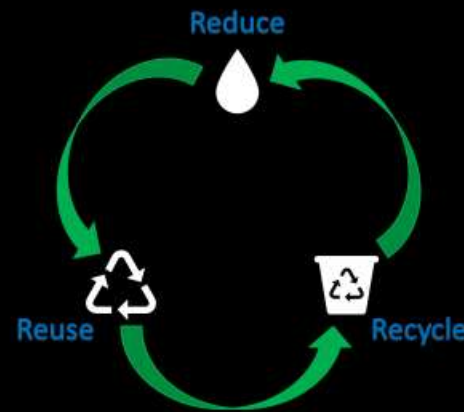
Restoration Project

Although it's too much risky to proceed the trial-and-error method, a project is approved for the restoration of "Santragachi Jheel". This project is being led by The Council of Nature Watchers ("Prakriti Samsad"). University of Calcutta and Nature Mates are working parallelly too for its restoration.

Some steps are being taken in this research which are maintained further.



"3R" Management



- **Reduce** the waste amount and avoid plastic materials (i.e., nonbiodegradable) which is **toxic** to lake ecosystem.
- **Reuse** of wastage, like plastic bottles. Make biofertilizers from biodegradable wastes; that will not only reduce the nutrient load but also helpful for **farming with zero toxicity**.
- **Recycle** of nonbiodegradable wastages (like; glass, plastics & metals) which is also beneficial for **sustainable development**.

Appropriate Sanitation System

- All drains open into lake and waste products are released into it which causes not only the overload of nutrient but also massive pollution of water.
- All drains should be oriented to a high drain like “moukhal”.
- This will greatly reduce the nutrient load on lake.
- Reduction of nutrient load will help to maintain a balanced growth of water hyacinth and will form a proper ecosystem.

Hyacinth Usage

- Each year water hyacinth is removed and kept at the side of lake due to lack of funding. They degrade and mix with lake water which increases nutrient load in a huge amount.
- So, usage of removed hyacinth can be beneficial. Like;
 - ✓Hyacinth can be used to make handcrafts.
 - ✓It can be taken as food especially for cattle. But it is in research level and can causes damage to animals as hyacinth can absorb heavy metals which can be deadly because of biomagnification.

Wastewater Recycling

- It's a substitute of the previous one.
- Instead of proper sanitation process domestic wastewater can be thrown to lake after purification.
- Firstly, all drain water must reach a reservoir and thereafter it will be purified and then it can be mixed with lake water.
- Thus, nutrient load can be maintained as well.

ACKNOWLEDGEMENT

We would like to express our gratitude towards our respected Principal **Dr. Soma Bandopadhyay** for allowing us to present our project. We feel thankful to IQAC co-ordinator **Dr. Kuntal Chattopadhyay** on this auspicious day.

We would like to thank **Prof. Subrata Kumar Basu, Dr. Sutirtha Sarkar & Prof. Prosenjit Dawn** who is a young naturalist and our alumnus along with our departmental teachers for their guidance throughout the project.

Narasinha duttcollege

DEPT: ZOOLOGY (HONS.)SEM~II

TOPIC: ECOSYSTEM RESTORATION

SUB TOPIC: POND/LAKE ECOSYSTEM RESTORATION



ROMIT BASU



RANIT ROY



SUCHETANA GHOSH



SHATABDI SARKAR

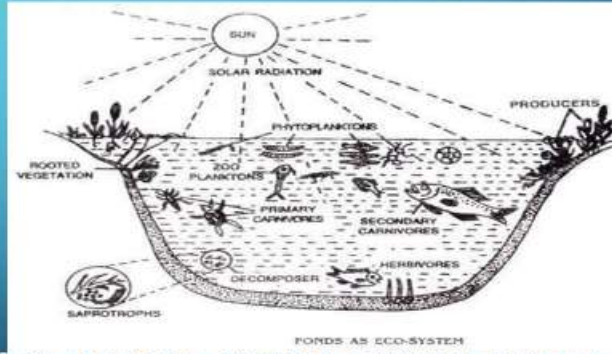
WHAT IS POND/LAKE 'ECOSYSTEM'?

- A pond or lake ecosystem is an ecosystem that includes biotic plants, animals and micro organisms, as well as abiotic (non-living) physical and chemical interactions.

□ Biotic components:

- Producers [eg: Algae]
- Consumers [eg: fish]
- Decomposers and transformers [eg: mushroom]

□ **Abiotic components** : soil, water, oxygen, carbon dioxide etc.



TROPHIC LEVEL OF POND/LAKE ECOSYSTEM

A pond ecosystem food chain has 3 basic trophic levels :-

1st trophic level:

Consist of producers i.e. phytoplanktons and plants. They prepare their own food with the help of sunlight.

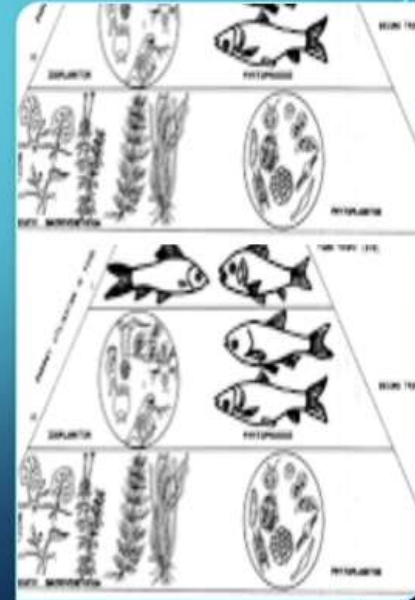
2nd trophic level:

Consist of herbivores, such as insects, crustaceans, invertebrates who consume the plants.

3rd trophic level:

Consist of carnivores, such as various fishes which feed on both producers and herbivores.

Saprophytes (decomposers) present at lowest level of food chain



HOW IS A POND/LAKE ECOSYSTEM POLLUTED?

The natural waste from living or dead organisms can be degraded by bacteria, the process need oxygen, it is us who cause pollution.

One kind of pollution is dumping of wastes/rubbish, plastics duffers upon pond they look untidy and also degrade the quality of water.

□ Chemical fertilizer cause algal bloom, as a result oxygen cannot penetrate, fishes die.

Why should we restore pond/lake ecosystem?

- PONDS OR LAKES PROVIDE HUMAN BEING WITH SERVICES THAT INCLUDE ~
 - 1) WATER FOR IRRIGATION, DRINKING AND INDUSTRY
 - 2) AQUACULTURE
 - 3) AESTHETIC VALUE
 - 4) IMPORTANT HOT SPOT FOR BIODIVERSITY
 - 5) SOME BIRDS COMPLETELY DEPEND ON POND ECOSYSTEM FOR FOOD
- SOME SHOULD RESTORE THE POND ECOSYSTEM TO SAVE US, SAVE THE NATURE



EFFECT OF WATER POLLUTION ON POND/LAKE ECOSYSTEM

ALGAL BLOOM AND EUTROPHICATION:

THE EXCESSIVE GROWTH OF PLANT AND ALGAE IS DUE TO FERTILIZERS WHICH ARE USED IN THE AGRICULTURAL FIELD. THIS ALGAE REDUCES OXYGEN LEVEL IN THE WATER WHICH CAUSES EUTROPHICATION.

THE DISSOLVED OXYGEN IS USED TO DECOMPOSE ALGAE AS A RESULT FISH AND OTHER AQUATIC ANIMALS DIE DUE TO SHORTAGE OF OXYGEN, SO THE TOTAL POND ECOSYSTEM GETS DESTROYED.

ECOSYSTEM RESTORATION

- ❖ **TREE:** manage trees and shrubs to maintain an open and sunny pond.
- ❖ **DUSTBIN:** Installation of at least two dustbins beside a pond is required. One for degradable and non degradable waste separately. thus maintaining a proper cleanliness.
- ❖ **PEOPLE AWARENESS:**
 - **MIKING** : common people can help in many ways in restoration of ecosystem so we have to convey this initiative through miking
 - **BANNER:** presentable hoardings and banners will encourage more people to get involved in saving mother nature.



BIO MAGNIFICATION

Pond becomes toxic due to presence of toxic substances



Fish becomes toxic as they eat toxic plankton from pond



Toxin is transferred to the top consumer through the food chain and the top consumer becomes intoxicated and finally dies

ROLE OF GOVERNMENT

- **Strict fine:** imposition of fines should be done on behalf of government to stop people from littering the pond again.
- **Pisciculture** : after proper cleaning of the water body different aquatic animals such as prawns, carps of rohu, catla, mrigel...etc .can be cultured through ministry initiative



ACKNOWLEDGEMENT

- We would like to express our special thanks of gratitude to our respected principal madam 'Dr. Soma Bandyopadhyay' who provided us this golden opportunity to do this wonderful PPT on 'POND /LAKE ECOSYSTEM RESTORATION' and we would also like to thank our H.O.D madam Dr. Shampa Sarkar and all professor of our department for extending their help and support towards us.
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Acknowledged by

ROMIT BASU

SUCHETANA GHOSH

RANIT ROY

SHATABDI SARKAR

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[zoology Hons., sem-II]

Thank You

