

WHEN SCIENTISTS GO UNDER THE WATER
BİLİM İSNALARI SUYUN ALTINA İNDİĞİNDE

LIFE OF THE LAKES

Funded by the European Union

HORIZON-MSCA-2023-CITIZENS-01-01

What is the "ScienceInBlue" Project?

SCIENCEinBLUE is a project funded by the European Union and implemented by the International Underwater Research Center of Boğaziçi University, Galatasaray University, and Akdeniz University.

SCIENCEinBLUE aims to address the question, "When do scientists dive beneath the seas?" by connecting children and young minds with expert researchers working in the fields of underwater science and technology. Through this, it seeks to raise awareness in society about underwater research and innovation.

7 Bölgede 140 Okulda



To broaden participation, the aim is to organize at least 140 "Researcher at School" visits to primary and secondary schools across Turkey's seven different regions (20 visits per region).

27-28 September 2024
Galatasaray University

26-27 September 2025
Akdeniz University




MAVİ
HACKATHON
Denizin derinliklerinde teknoloji macerası başlıyor!
Mavi Hackathon, lise öğrencilerini İstanbul Boğazı'nı keşfetmeye ve kodlama becerilerini geliştirmeye çağırıyor. Galatasaray Üniversitesi ndeki etkinlikte öğrenciler, boğazın verilerini toplayacak bir cihaz geliştirecek. Tasarlanan ürün bir ROV'a monte edilecek ve öğrenciler, kendi kodladıkları cihazın dalışını kıyıdan izleyebilecekler.
MAVİDE BİLİM
www.scienceinblue.eu


KÖPRÜÜSSÜ
SİMÜLATÖRÜ
27 Eylül 2024
09:00 - 18:00
Denizciliğe yelken açmaya hazır mısın?
MAVİDE BİLİM
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TEA TALK
27 Eylül 2024
AYDIN DOĞAN SALONU
16:00 - 17:00 Çay/Kahve İkramı
17:00 - 19:00 Sunumlar
The Science of Diving
MAVİDE BİLİM
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BOĞAZDA
GECE
DALIŞI
27 Eylül Cuma
17:00 - 23:00
MAVİDE BİLİM
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ARAŞTIRMA
VE
DALIŞ
ARAÇLARI
27 Eylül 2024
10:00 - 18:00
Cuma
SARAY BİNASI
SERGİ SALONU
MAVİDE BİLİM
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BOĞAZDA
SATIH
DESTEKLİ
BİLİMSEL
DALIŞ
28 Eylül Cumartesi
10:00 - 12:00
MAVİDE BİLİM
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DENİZLERİN
MİRASI
Okyanuslar ve sualtı kültür mirası hakkında ne kadar bilgiye sahibiz?
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ROBOTLAR
SENİ ÇAĞIRIYOR!
28 Eylül Cumartesi
13:30 - 18:00
MAVİDE BİLİM
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Dr. Emine Şükran Okudan

I completed my primary, middle, and high school education in Antalya. After graduating from Hacettepe University's Department of Biology, I completed my Master's and Doctoral studies at Ege University on the topics of "Taxonomy and Ecology of Marine Macroalgae and Seagrasses." I am currently continuing my research in these areas as a faculty member at Akdeniz University, Faculty of Fisheries.

How Did I Start Diving?

From a very young age, I had a special interest in water, which always captivated me. In 1997, I took my first diving course in Antalya, marking the beginning of my journey into the underwater world. Later, I completed my SCUBA diving instructor training in Sinop.

Since then, I have continued my career as a marine biologist, conducting underwater research using SCUBA diving as an essential tool for my studies. This passion for the aquatic realm has shaped both my personal and professional life.

Reference Project
R5. MPA - ENGAGE

The MPA-ENGAGE project is managed by the Spanish National Institute of Marine Sciences and is funded by the European Union's Interreg MED program, with an approximate budget of 3 million euros.

MPA-ENGAGE primarily aims to support the adaptation of Marine Protected Areas (MPAs) in the Mediterranean to the ongoing impacts of climate change and mitigate these effects. Adopting a participatory approach, MPA-ENGAGE monitors climate change impacts in a coordinated manner, conducts vulnerability assessments, and develops climate change adaptation action plans for 8 MPAs located in 7 Mediterranean countries (Albania, Croatia, France, Greece, Italy, Malta, Spain).

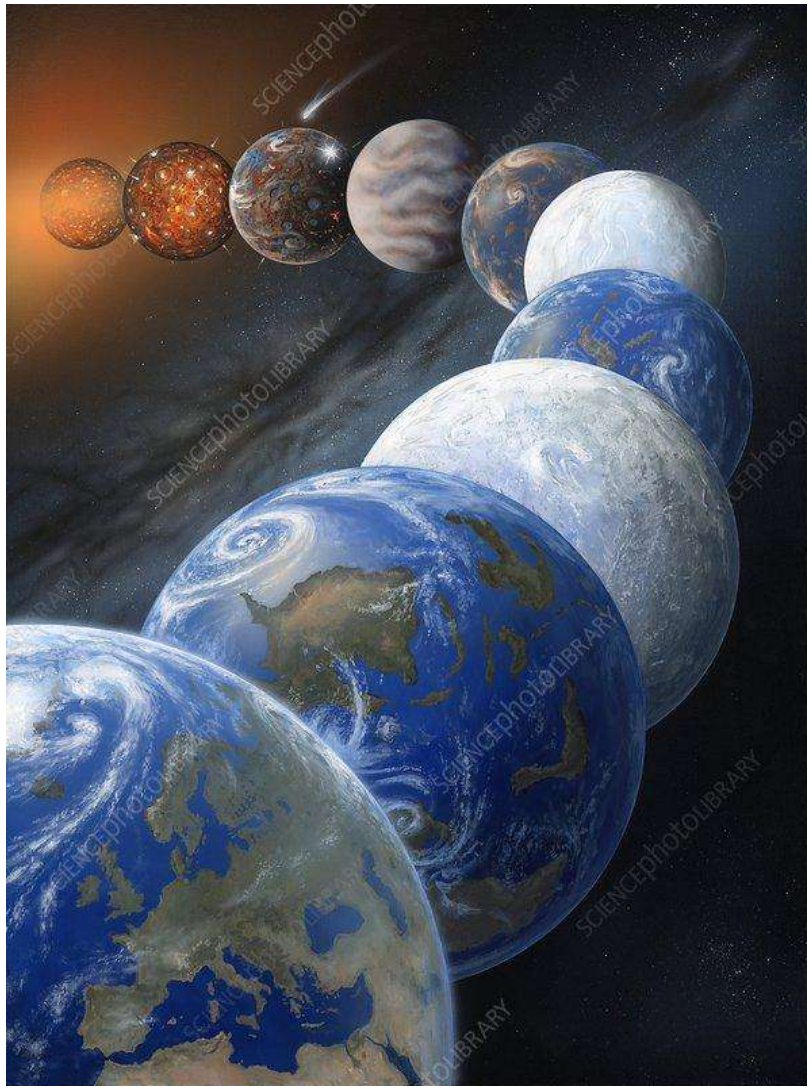
RELATIONSHIP BETWEEN THE MAIN SUBJECT AND THE REFERENCE PROJECT

R5. MPA ENGAGE

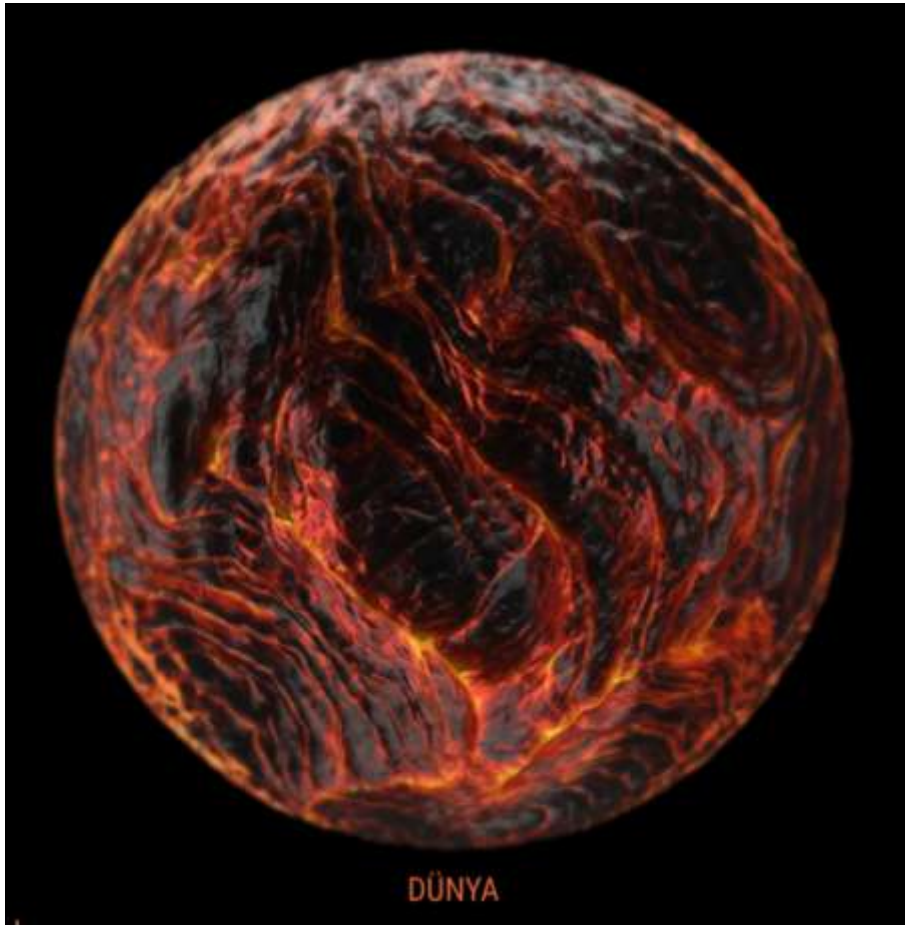
Global warming is affecting aquatic ecosystems. This situation makes sustainability efforts essential. The MPA-Engage project provides comprehensive solutions to the environmental, economic, and social impacts of global warming. To achieve this, it prioritizes the sustainability of aquatic protected areas and awareness-raising efforts. These projects also aim to mitigate the effects on marine and coastal ecosystems, raise public awareness, and develop more resilient systems against future threats.

When viewed from space, our Earth resembles a blue sphere. This is due to the fact that a large portion of its surface is covered by water.

But was the Earth always like this? How did the oceans and lakes form?



When the Earth formed about 4.56 billion years ago along with the Solar System, its surface and atmosphere resembled a fiery ball made up of molten rocks at temperatures of thousands of degrees.



Water from the Depths of the Earth

Water vapor, along with various gases from the Earth's depths, was released into the atmosphere by volcanoes, and it rained continuously for hundreds of thousands of years. The rainwater filled the depressions of the Earth's surface.



Water from space

During the first 600 million years of its formation, Earth was bombarded by numerous large asteroids and comets. Especially the abundant water in comets was brought to Earth in this way.



Lakes, defined as depressions filled with water in terrestrial areas, are formed as a result of geological processes.

Around the world, lakes of various shapes, sizes, and depths can be found, ranging from small ponds to large inland seas.

The formation processes and geological structure of lakes influence their biological diversity and ecosystems.

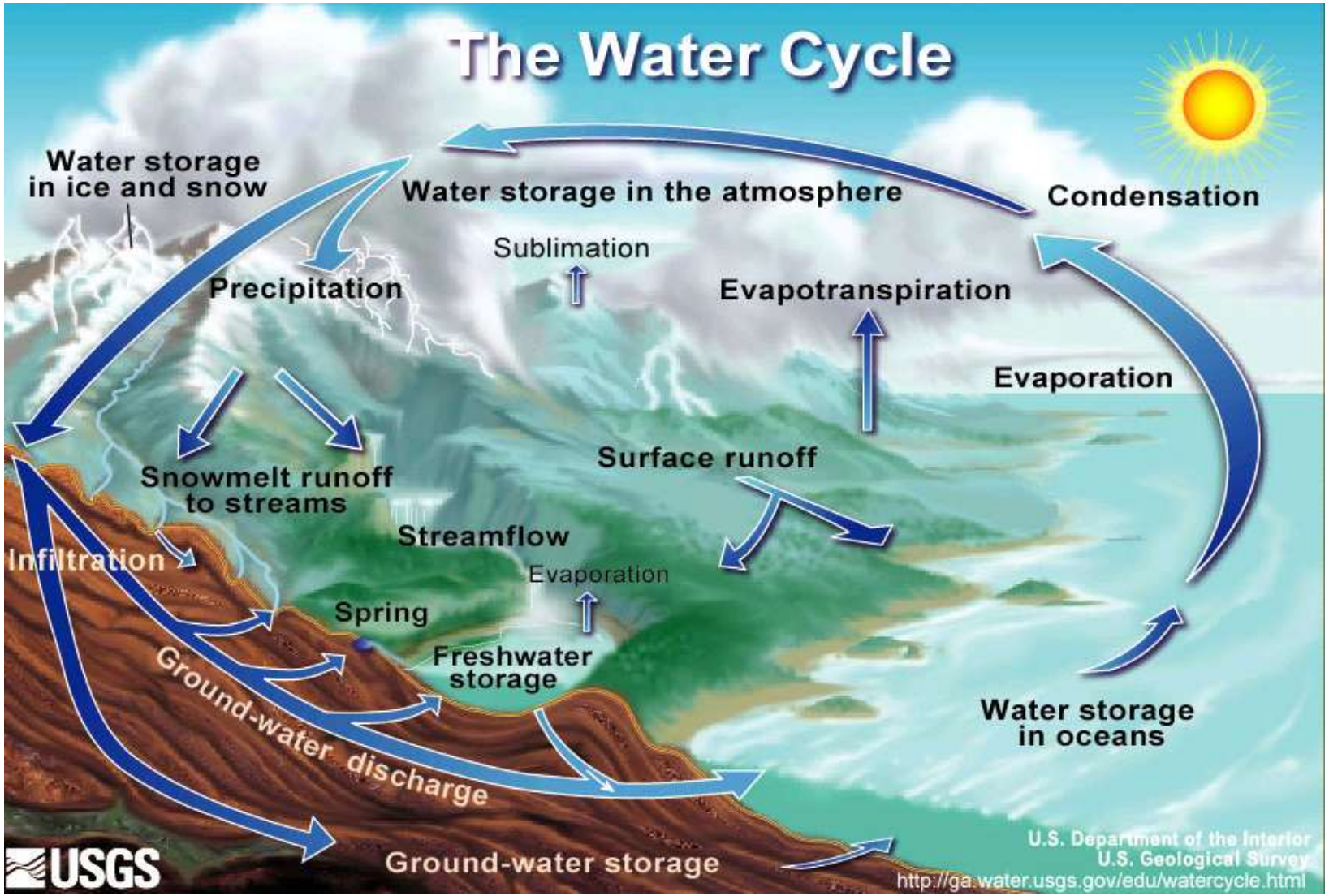


Lakes are water bodies that are rich in biological diversity and ecologically important on Earth.

They are vital ecosystems that support living life. They provide habitats for a wide variety of flora and fauna species, ranging from microscopic organisms to large fish and birds.



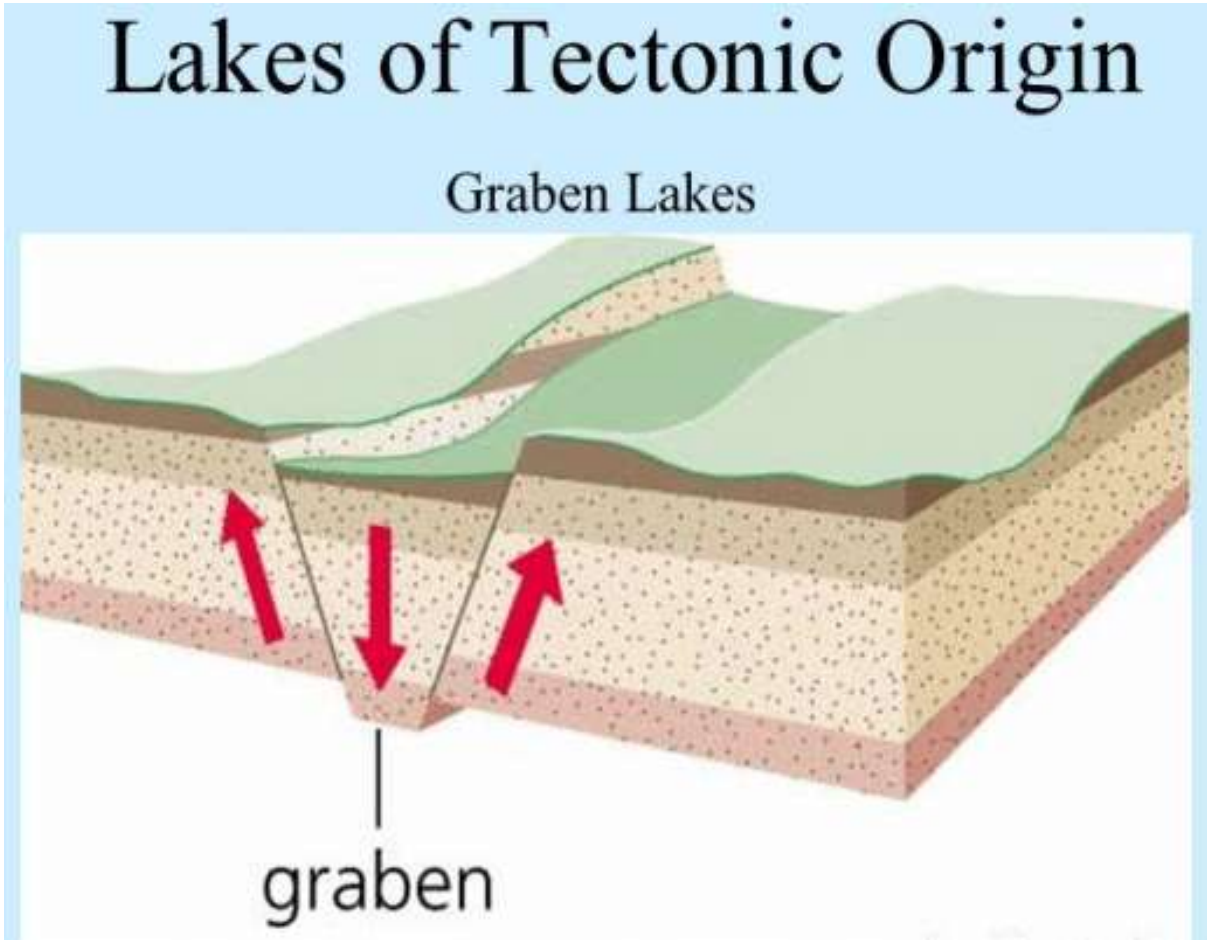
Lakes play a critical role in the global water cycle.



Formation and Types of Lakes

Tectonic Lakes

These are lakes formed in fault lines and depressions caused by the Earth's tectonic plate movements. Such lakes are usually large and deep. The Great Rift Valley in Africa is an example where many lakes have formed due to the separation of tectonic plates.





Glacial Lakes

As glaciers advance and retreat, they carve valleys and depressions, creating glacial lakes. These lakes are especially common in high latitudes and mountainous regions. The erosive effect of glaciers creates deep, typically U-shaped lakes.



Volcanic Lakes

Volcanic lakes are formed when water accumulates in craters, calderas, or depressions created by volcanic activity, such as lava flows. These lakes are usually deep and circular in shape. The water in these lakes can have unique properties due to the influence of volcanic minerals. An example of this type of lake is the crater lakes on Mount Nemrut in Turkey.



Karstic lakes

Lakes formed in depressions created by the erosion of rocks, which are formed as a result of the interaction between crystallized solid substances, are called karstic lakes. These rocks do not resist erosion. Karstic lakes are generally small and shallow, but some can be quite deep. An example of this is Salga Lake.



Oxbow lakes

Rivers, by eroding their banks, can form ox-bow lakes and meander lakes. These lakes occur when the river alters its course, causing the old riverbed to fill with water. Ox-bow lakes are typically found in river floodplains.



Reservoir Lakes

Human activities can also contribute to the formation of lakes. Dams built for hydroelectric or irrigation purposes can create artificial lakes, and the ecological impacts of these lakes can be significant.



Lake Water Quality Parameters

1 – Physical Water Quality Parameters in Lakes

Temperature
Water temperature affects various biological, chemical, and physical processes in aquatic ecosystems. It can influence the solubility of gases, the metabolic rates of aquatic organisms, and the distribution of species.

Turbidity
Turbidity refers to the clarity or cloudiness of water caused by the presence of suspended particles. High turbidity levels can reduce light penetration in water bodies, thereby affecting photosynthesis and oxygen production. It can also clog fish gills.

Color
Water color is an important visual indicator of its quality. It can be influenced by natural factors such as dissolved organic matter, or by human activities like industrial discharges or pollution. Unusual or significant changes in water color can indicate the presence of pollutants or contaminants.

Electrical Conductivity
Electrical conductivity measures the ability of water to conduct electrical current. It provides an indication of the concentration of dissolved salts, minerals, and other substances. Conductivity is an important parameter for assessing water quality and can indicate the presence of pollutants or changes in salinity levels.

Total Dissolved Solids (TDS)
TDS refers to the combined content of inorganic and organic substances dissolved in water. It includes minerals, salts, metals, and other dissolved particles. High TDS levels can affect the taste of water and its suitability for drinking, irrigation, or industrial processes.

2 – Chemical Water Quality Parameters in Lakes

Dissolved Oxygen (DO)
DO refers to the amount of oxygen dissolved in water. Low dissolved oxygen can be triggered by factors such as organic pollution, eutrophication, and algal blooms. A minimum of 4 ppm DO is required for fish survival.

Nutrients
Nutrients include nitrogen and phosphorus, which are essential for plant growth. However, excessive nutrient levels, often resulting from human activities such as agriculture or wastewater discharge, can lead to eutrophication.

Heavy Metals
Heavy metals such as lead, mercury, cadmium, and arsenic are found among this group. These metals can easily enter water bodies through industrial discharges and mining activities. They are inherently toxic and can accumulate, posing serious risks to human health and aquatic life.

Chlorine and Chloramines
Chlorine and chloramines are disinfectants commonly used in water treatment processes.

pH
pH gives an indication of acidity or alkalinity. It affects chemical reactions, the solubility of minerals, and the efficiency of water treatment processes. pH levels outside the acceptable range can have harmful effects on aquatic life and water treatment systems.

Pesticides and Herbicides
These are chemicals used in agriculture to control pests and weeds.

Organic and Inorganic Pollutants
Various organic and inorganic pollutants can degrade water quality. These pollutants include industrial contaminants, pharmaceuticals, and others.

2 – Biological Water Quality Parameters in Lakes

Biodiversity

Biodiversity refers to the variety and abundance of different species in an ecosystem. Assessing the biodiversity of aquatic ecosystems helps in understanding their ecological health and resilience. Changes in biodiversity patterns can indicate disruptions in water quality and ecosystem functioning.

Aquatic Macroinvertebrates

These include mollusks, worms, crustaceans, etc. They are used as bioindicators of water quality. These organisms have different tolerances to pollution and habitat degradation, and their presence, absence, or abundance can provide insights into the overall ecological status of water bodies.

Phytoplankton

Phytoplankton are algae that play an invaluable role in aquatic ecosystems. They produce oxygen through photosynthesis and form the foundation of the water food chain.

Zooplankton

Zooplankton are small aquatic animals that are carried by the water current. Some examples include rotifers, protozoa, etc. These organisms serve as a food source for aquatic organisms. They also play an important role in the nutrient cycle. Changes in zooplankton communities can reflect shifts in water quality and trophic interactions.

Microorganisms

Microorganisms, including bacteria and viruses, are important for aquatic ecosystems. Some bacteria can indicate fecal contamination and the presence of pathogens, while others are beneficial in water treatment processes. Monitoring microbial populations helps in evaluating water quality and the effectiveness of treatment methods.

2 – Biological Water Quality Parameters in Lakes

Fish and Macrophytes

Fish and aquatic plants are sensitive to water quality. Monitoring fish populations and macrophyte communities helps assess the impact of pollution, habitat degradation, and changes in nutrient levels on these organisms and ecosystems.

Harmful Algal Blooms (HABs)

HABs are rapid and excessive growths of certain algal species, typically supported by high nutrient levels and warm temperatures. HABs can lead to the production of toxins, which are harmful to aquatic life and human health. Monitoring and early detection of HABs are crucial for protecting water quality and public safety.

Lake Ecosystems and Their Components

Lake Ecosystems and Their Components

1

water

The basic element of lakes is water. Water provides a living environment for all living things.

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2

Light

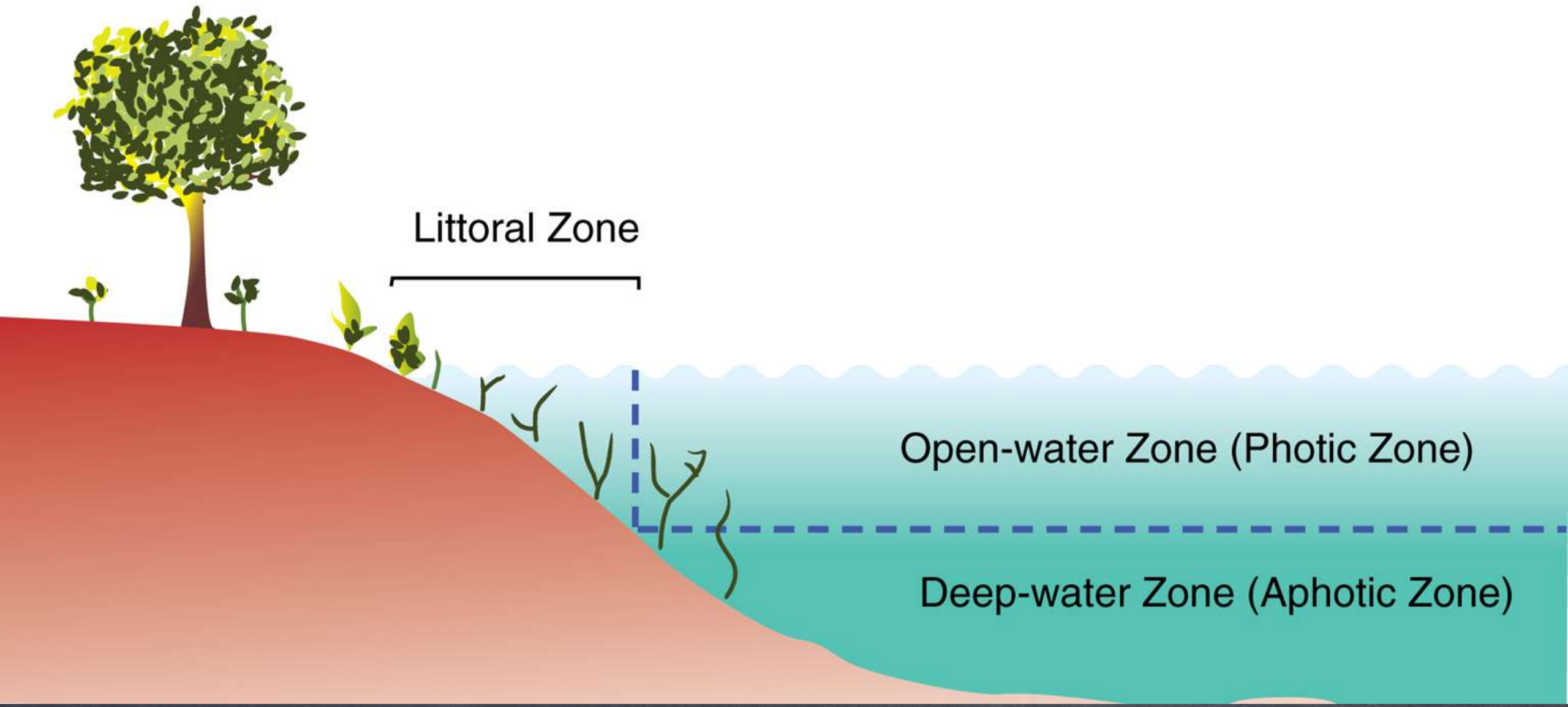
Light, which varies depending on the depth of the water, affects plant growth and the habitats of other living things in lakes.

3

Nutrients

Lakes contain organic and inorganic substances dissolved in water. These affect plant growth and the nutrition of other living things.

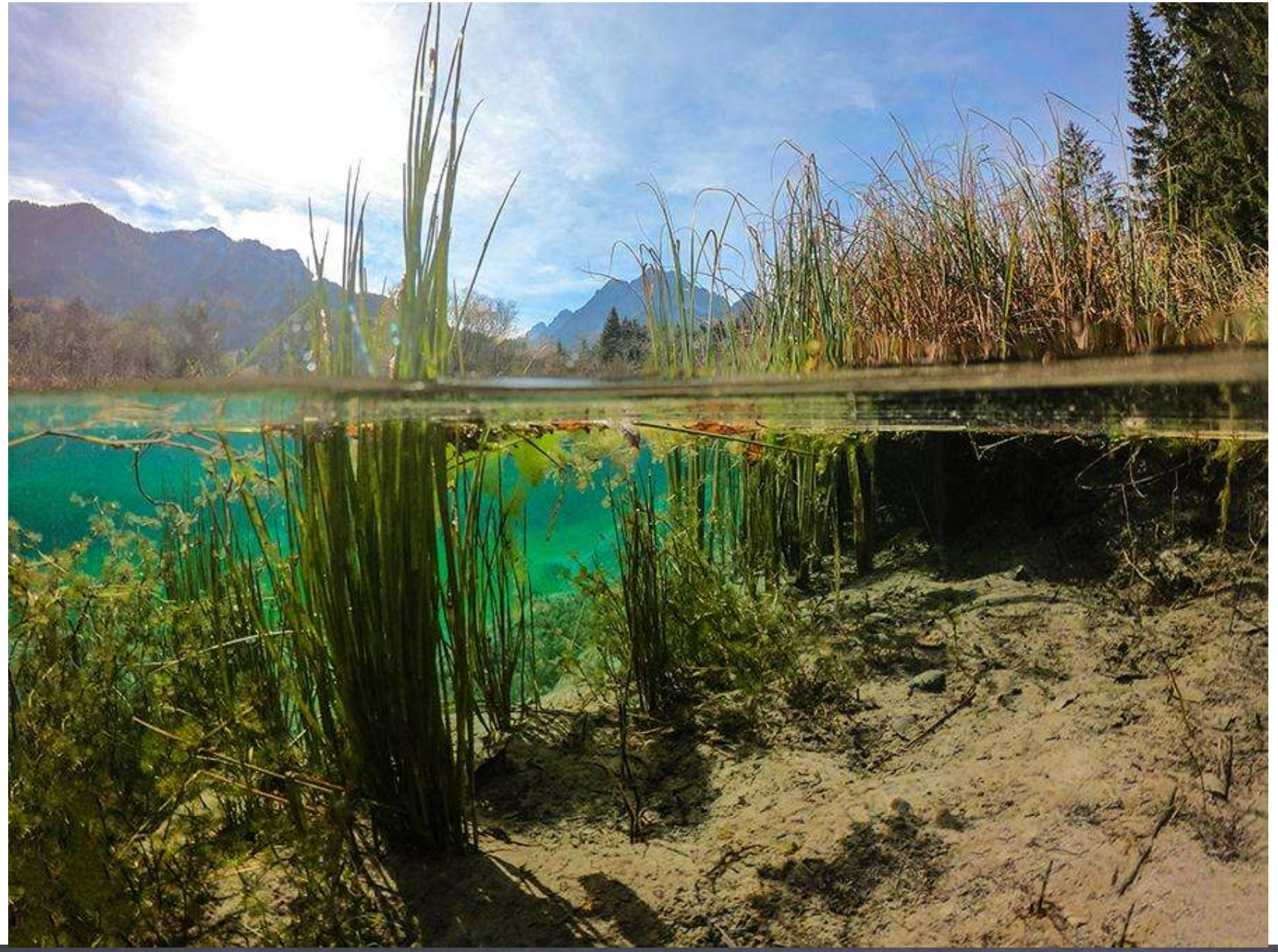



Littoral Zone
Open-water Zone (Photic Zone)
Deep-water Zone (Aphotic Zone)



Lake Ecosystems and Their Components

Base	Organic matter, sediments, bacteria, benthos organisms.
Benthic Zone	The area near the lake floor in contact with the water is home to a variety of invertebrates.
Limnetic Zone	**The open water area of the lake is inhabited by phytoplankton, zooplankton and fish.**
Littoral Zone	**The lake shores are home to aquatic plants, amphibians, reptiles and some bird species.**







Food Chain in Lakes



Life and Biodiversity in Lakes

1

Plant species

Lakes have vegetation that varies according to water level and nutrients. Reeds, duckweeds and water lilies are found in coastal areas, while algae and other aquatic plants live in deeper areas. These plants play an important role in the lake ecosystem as a source of Oxygen and also provide habitats for other creatures.

2

Animal species

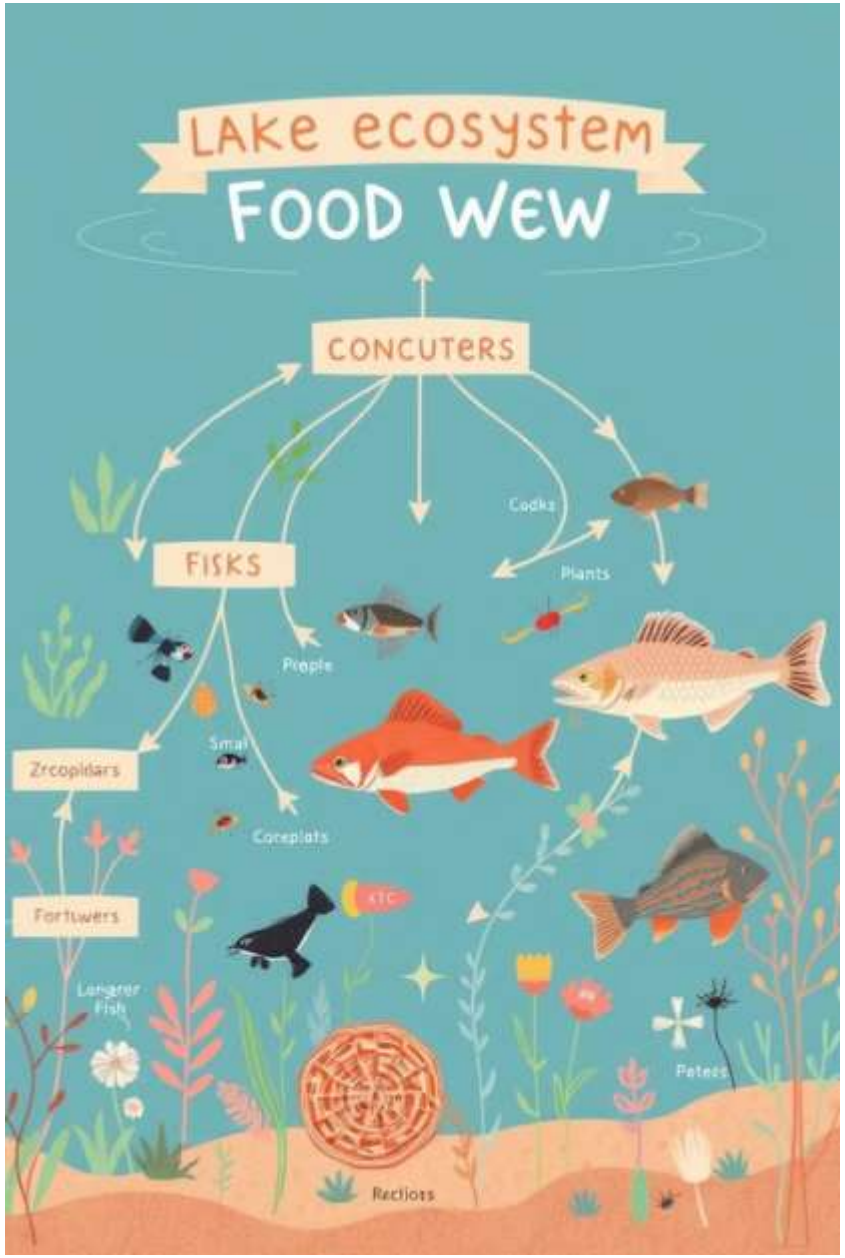
Lakes are home to a wide variety of animals, including fish, frogs, turtles, birds, mammals, invertebrates and insects. Lakes provide food, breeding and shelter for these creatures.

3

Microscopic creatures

Microscopic organisms such as phytoplankton, zooplankton and bacteria are essential components of the lake ecosystem and play an important role in the food chain.





Food Chain in Lakes

Producers	Plants, algae
Primary Consumers	Herbivorous fish, plankton
Secondary Consumers	Carnivores, carnivorous fish
Tertiary Consumers	Apex predators, big fish
Decomposers	Bacteria and fungi

Food Chain in Lakes

1

Producers

The foundation of the food chain in lakes is formed by primary producers such as aquatic plants and phytoplankton (algae). These organisms use sunlight to produce oxygen through photosynthesis and are the primary source of energy for the entire ecosystem

2

Primary Consumers

These herbivores, like zooplankton and small fish, feed on the primary producers. They play an important role in transferring energy to the next levels of the food chain.

3

Secondary Consumers

Carnivores that eat primary consumers, such as larger fish and invertebrates, make up the secondary consumers. These organisms help control populations of lower trophic levels.

4

Tertiary Consumers

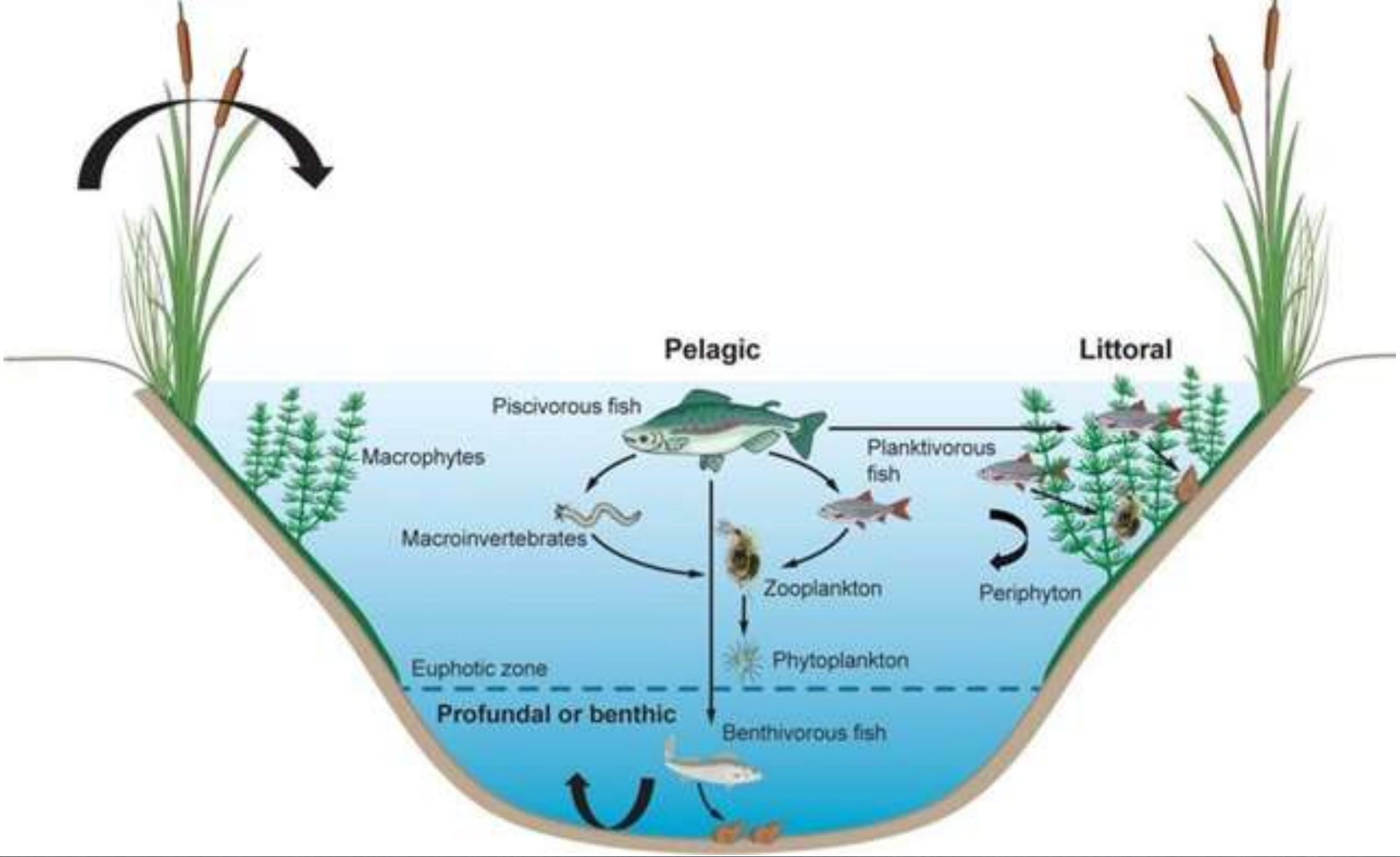
Apex predators, like large fish, birds, or mammals, feed on secondary consumers. They are at the top of the food chain and have few or no natural predators.

5

Decomposers

Microorganisms, including bacteria and fungi, break down dead organic matter, recycling nutrients back into the ecosystem. Decomposers are vital in maintaining ecological balance and making nutrients available for primary producers.




Pelagic
Littoral
Piscivorous fish
Macrophytes
Planktivorous fish
Macroinvertebrates
Zooplankton
Periphyton
Phytoplankton
Euphotic zone
Profundal or benthic
Benthivorous fish

Eutrophication and Pollution in Lakes



Eutrophication and Pollution in Lakes

1

Nutrient Enrichment

Excess nutrients from agricultural runoff and wastewater lead to eutrophication.

2

Algal Blooms

Algal blooms deplete oxygen and release toxins, threatening aquatic life.

3

Reduced Water Quality

Eutrophication degrades water quality, affecting ecosystem function and human use.

Eutrophication

Eutrophication can be defined as the enrichment of natural waters with inorganic nutrients, resulting in increased production of algae and aquatic plants.

The availability of nutrients such as nitrogen and phosphorus limits the growth of plant life in an ecosystem.

Fertilizers from agricultural fields

Untreated sewage

Detergents containing phosphorus

Industrial waste discharge.

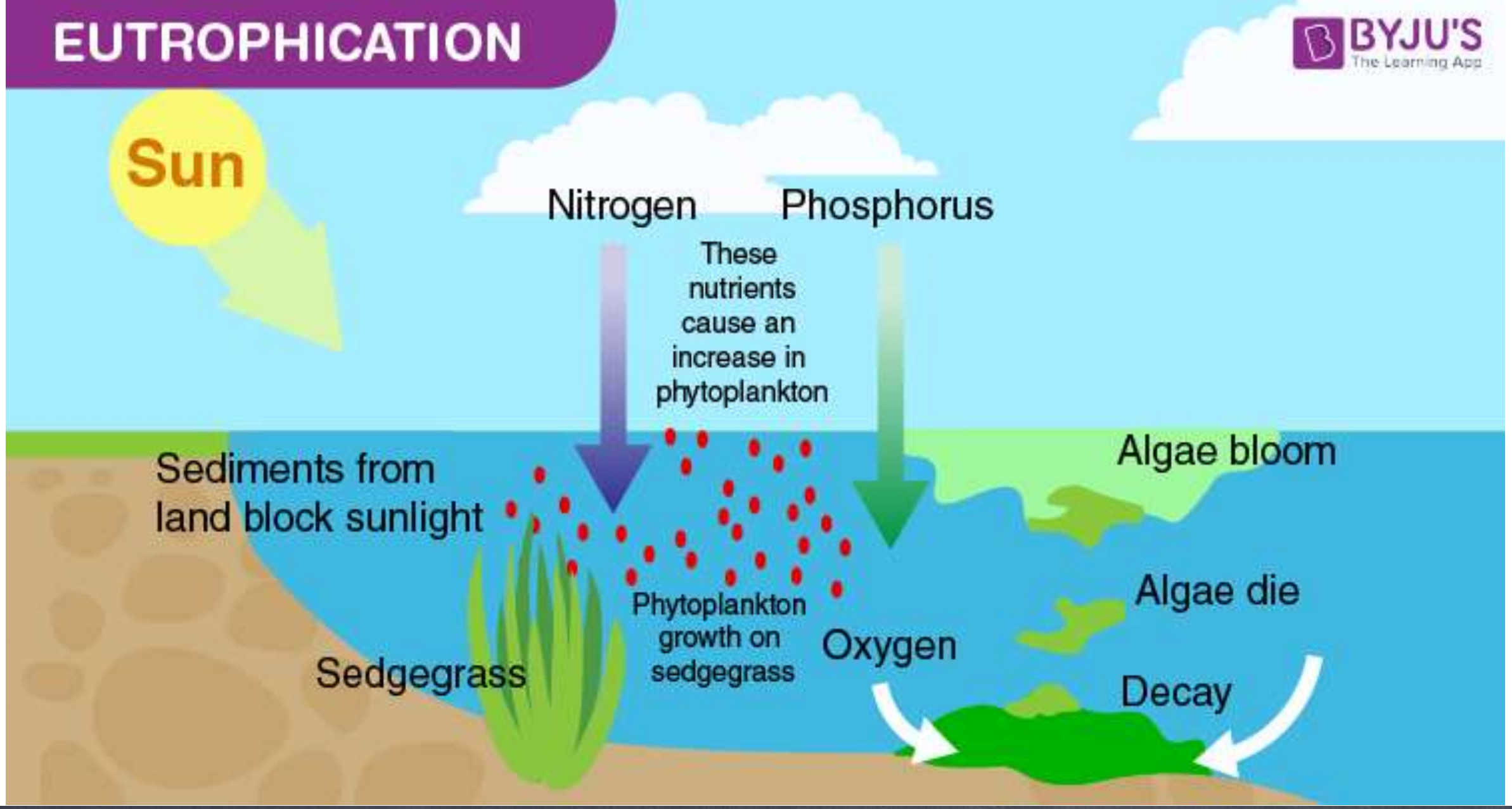


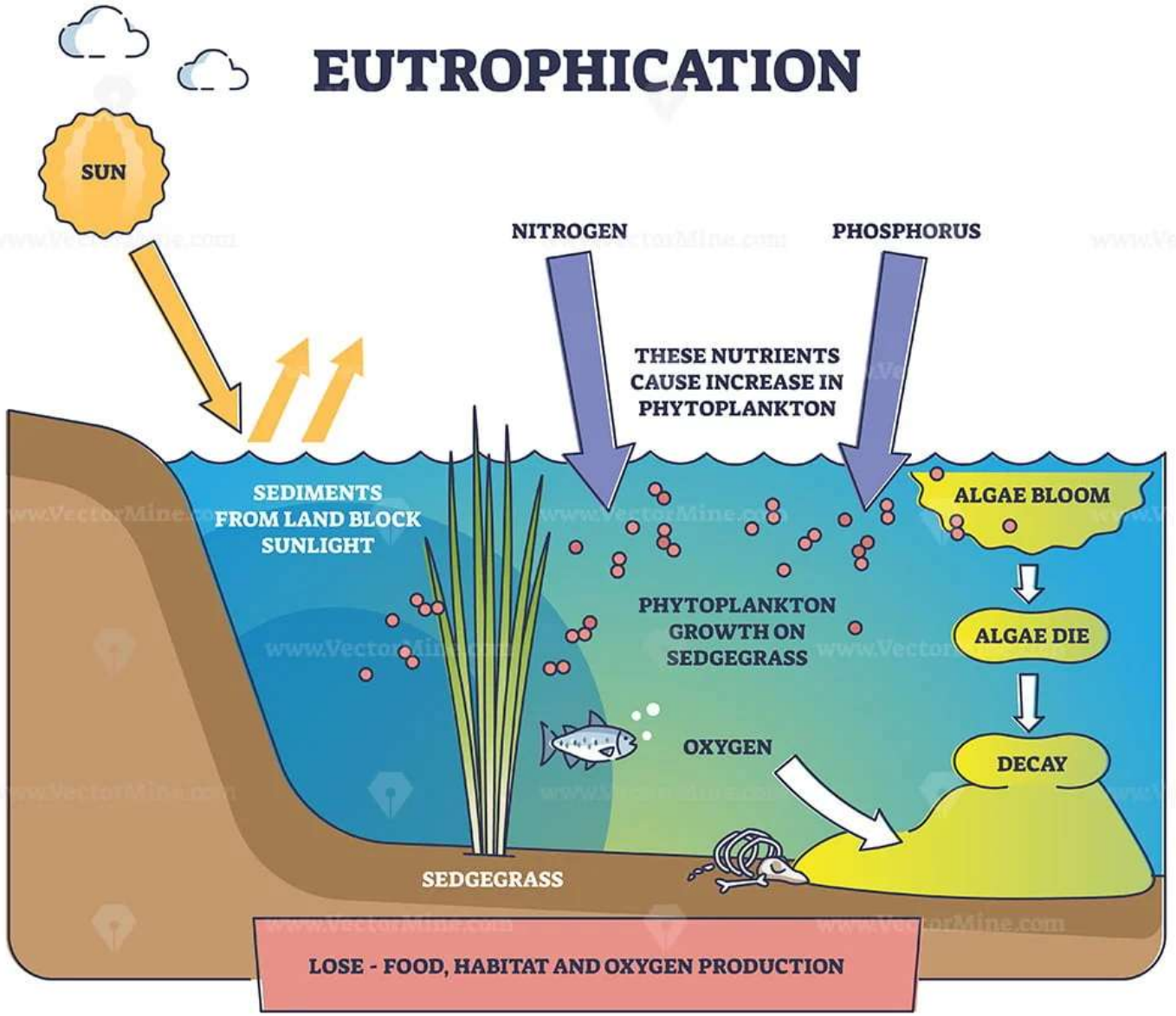
Eutrophication

In eutrophic waters, excessive algal growth is accompanied by the formation of large amounts of dead algal biomass. These dead algae settle to the bottom of the water body where they are broken down by bacteria, consuming oxygen in the process.

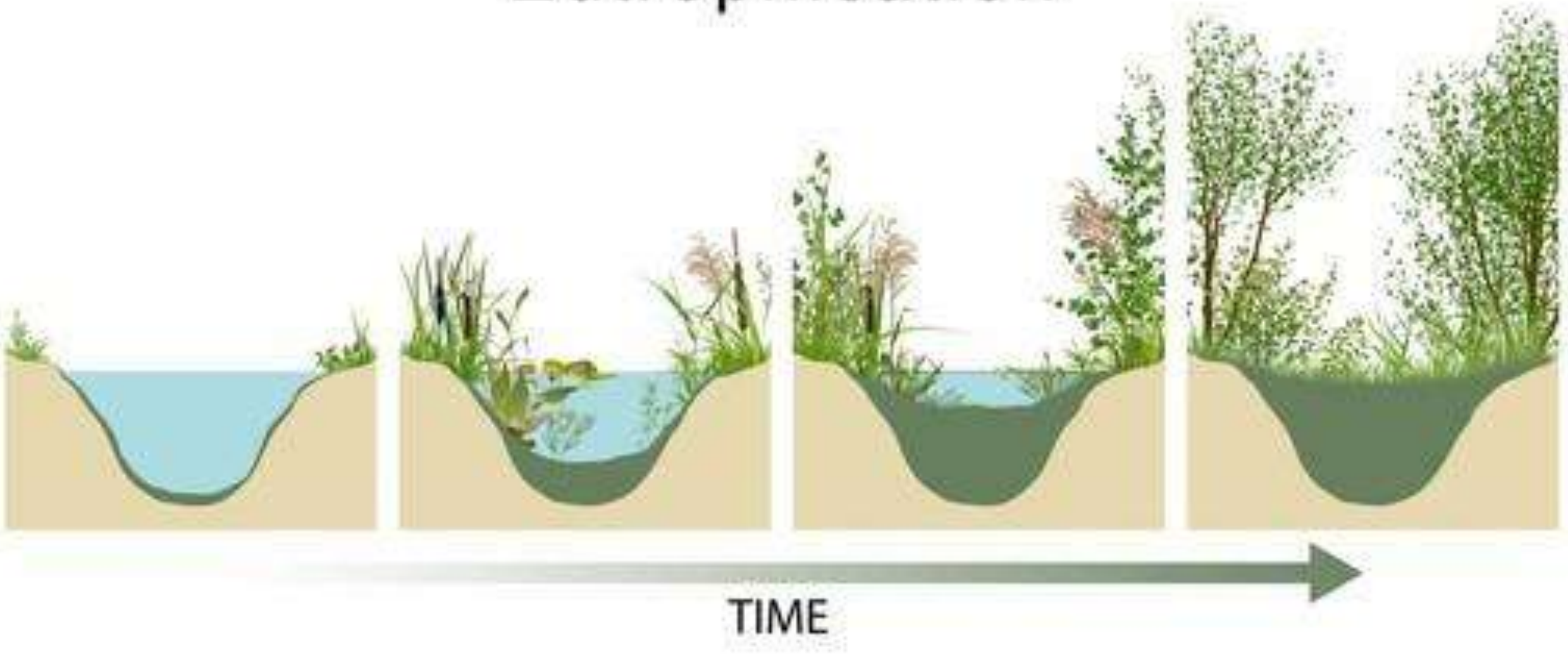
The excessive consumption of oxygen leads to hypoxic conditions (conditions of low oxygen levels) in the water. Hypoxic conditions in the lower levels of the water body lead to suffocation and eventual death of larger life forms such as fish.

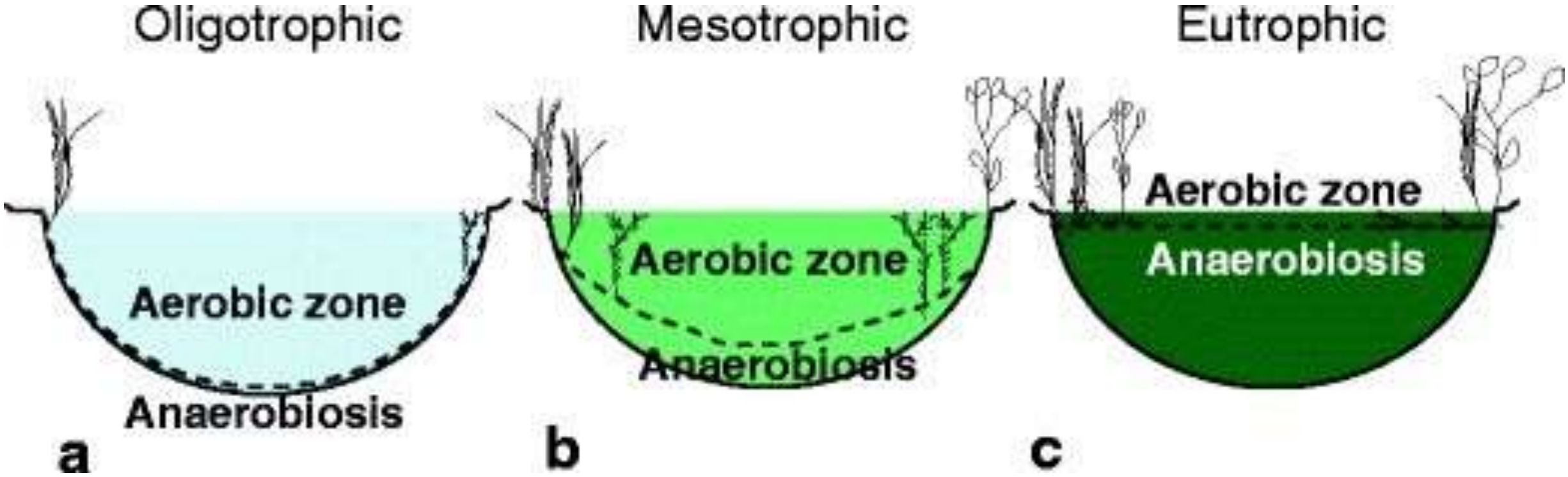



EUTROPHICATION
BYJU'S
The Learning App
Sun
Nitrogen
Phosphorus
These nutrients cause an increase in phytoplankton
Sediments from land block sunlight
Algae bloom
Algae die
Phytoplankton growth on sedgegrass
Oxygen
Sedgegrass
Decay


EUTROPHICATION
SUN
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ALGAE DIE
OXYGEN
DECAY
SEDGEGRASS
LOSE - FOOD, HABITAT AND OXYGEN PRODUCTION

Eutrophication




Oligotrophic
Mesotrophic
Eutrophic
Aerobic zone
Anaerobiosis
Aerobic zone
Anaerobiosis
Aerobic zone
Anaerobiosis
a
b
c

Ecological effects of eutrophication

Decline in biodiversity; fish mortality

Not only do these algae blooms block sunlight from reaching the bottom of the water body, they also cause large fluctuations in dissolved oxygen levels in the water.

When the dissolved oxygen in the water drops below hypoxic levels, many creatures suffocate and die. This reduces the effective biodiversity of the water body.



Ecological effects of eutrophication

Invasion of New Species

A limiting nutrient corresponding to a water body can become abundant through the process of eutrophication, leading to a change in the species composition of the water body and the ecosystem surrounding it.

If a nitrogen-deficient water body is suddenly enriched with nitrogen, many other competitive species can settle in the water body and compete with the original inhabitants of the ecosystem. One such example of a new species invading eutrophic conditions is the carp, which has adapted to these conditions.





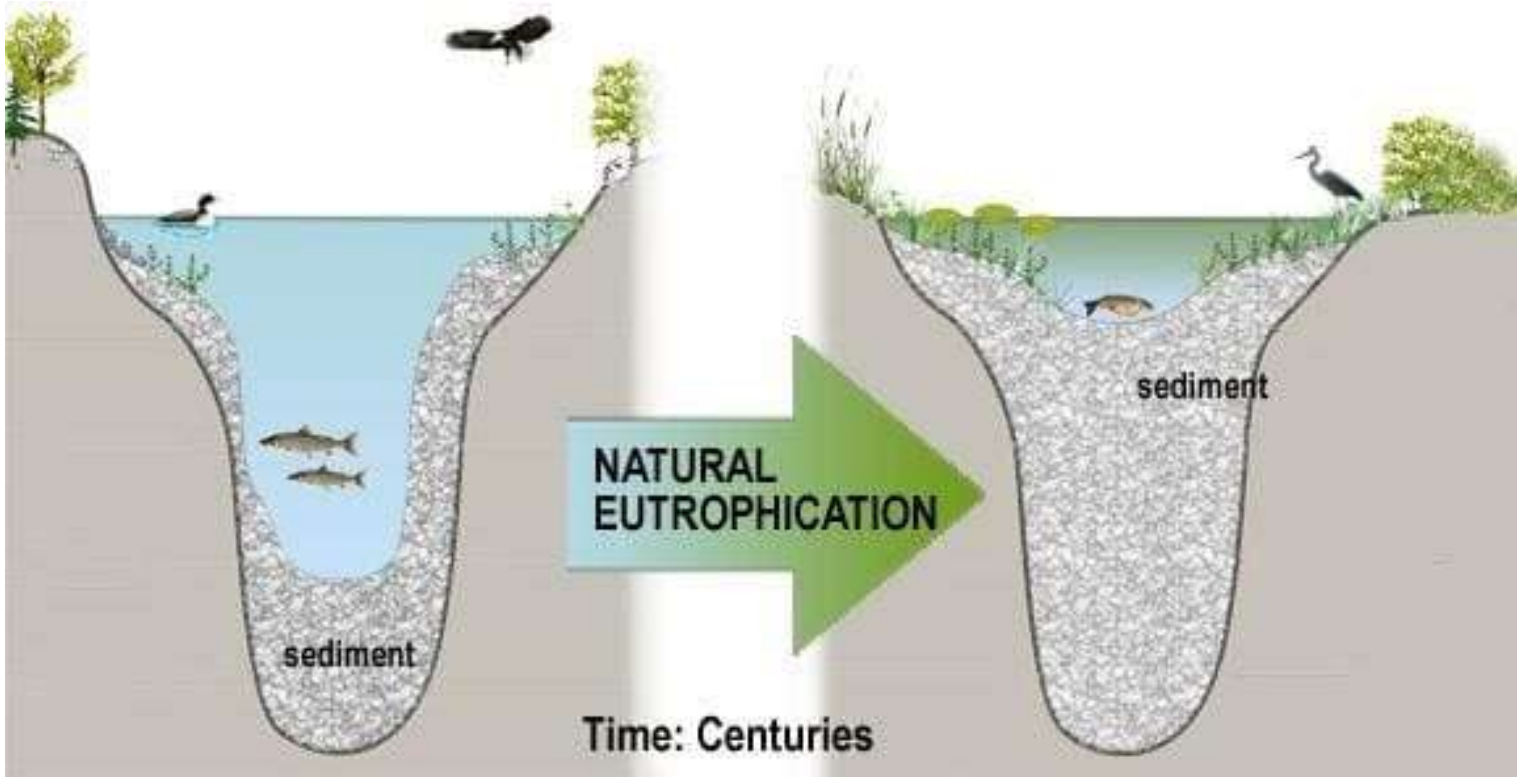


Natural eutrophication

It is an aging process in aquatic ecosystems without human influence.

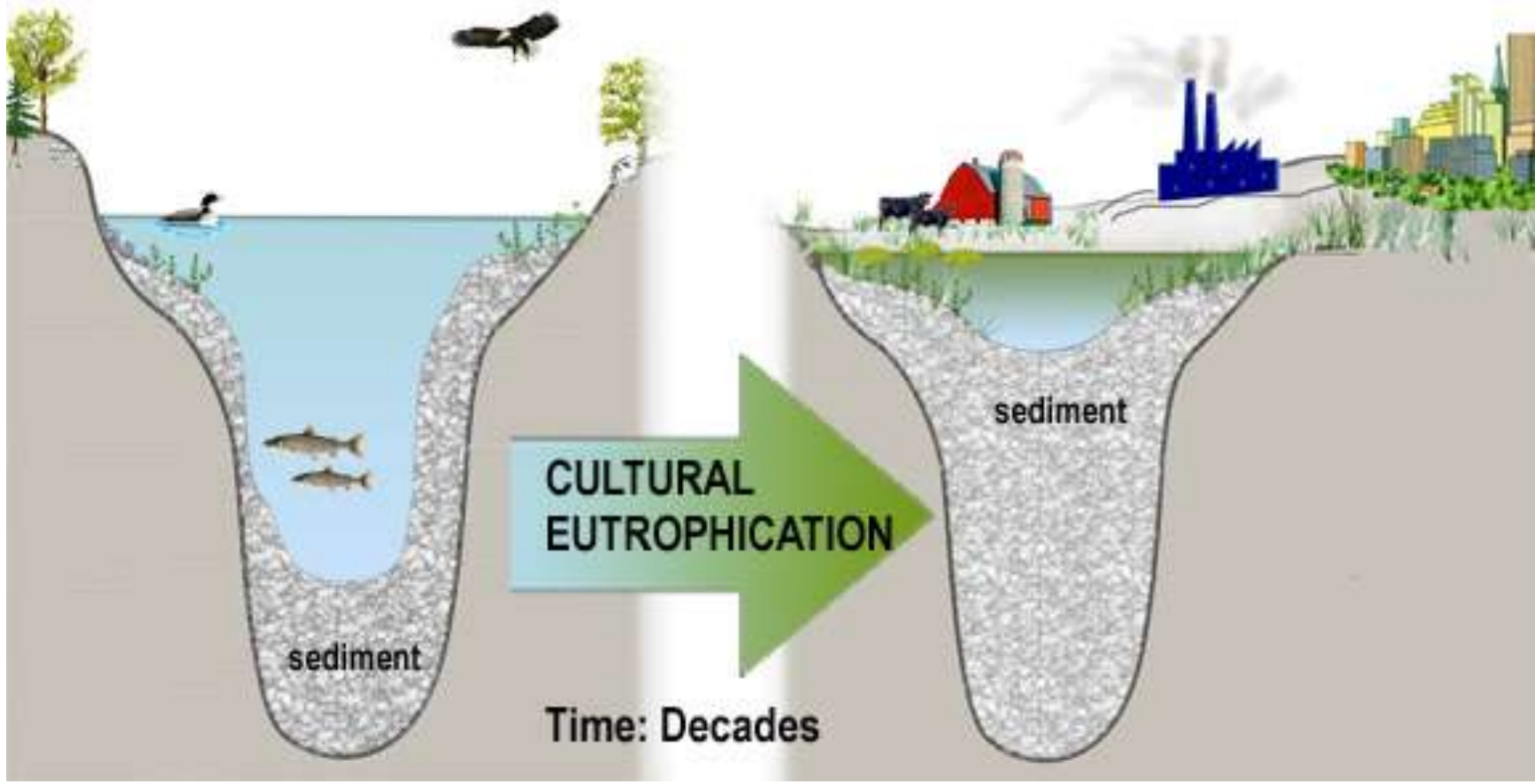
During this time, nutrient salts gradually increase and the depth of the lake decreases due to sediment accumulation.

The natural aging process is shorter in shallow lakes and very long in deep lakes (several million years).



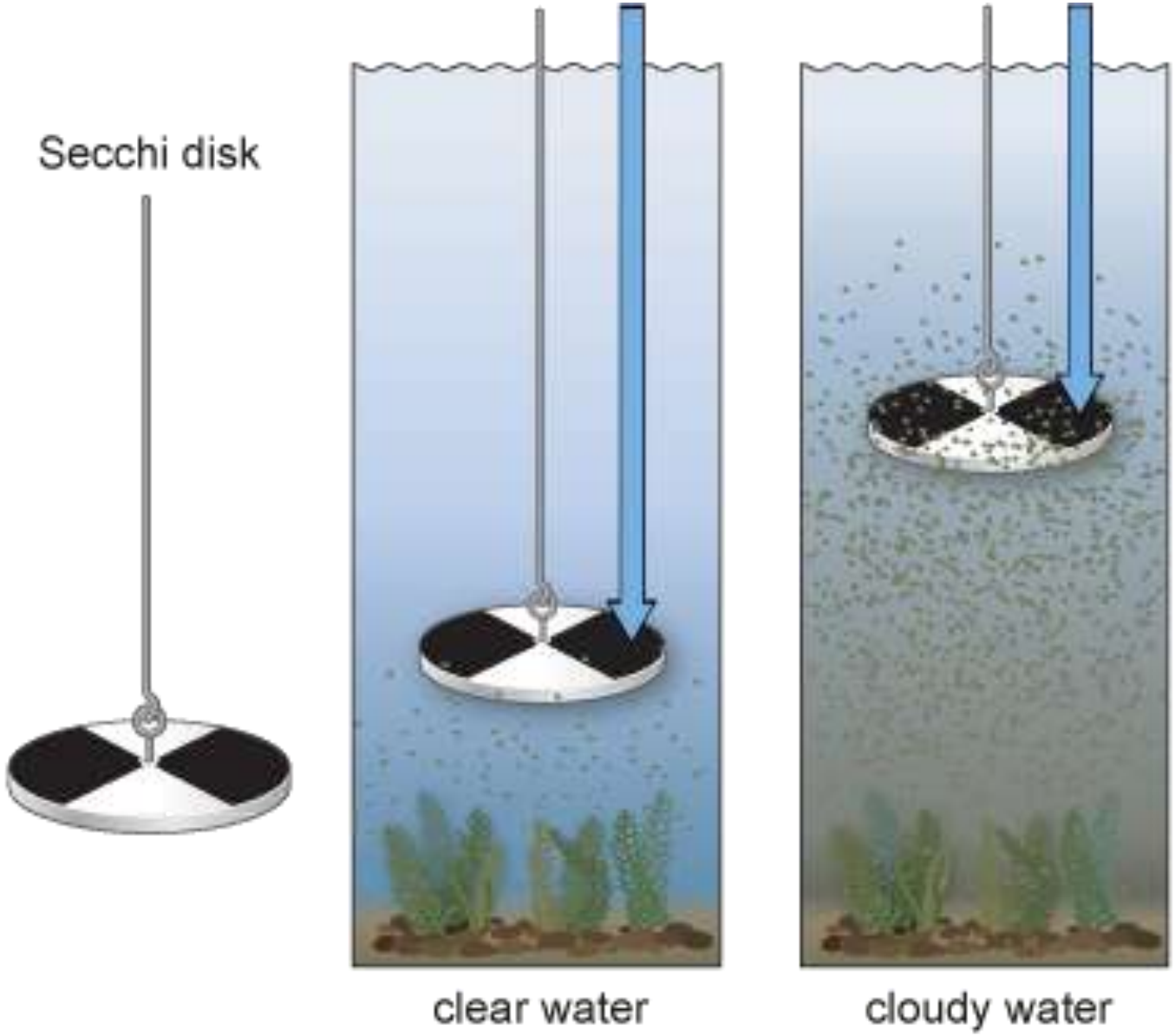
Cultural eutrophication

A process that occurs as a result of human activity and accelerates natural eutrophication



Secchi disk

A secchi disk is used to measure the clarity of a body of water.



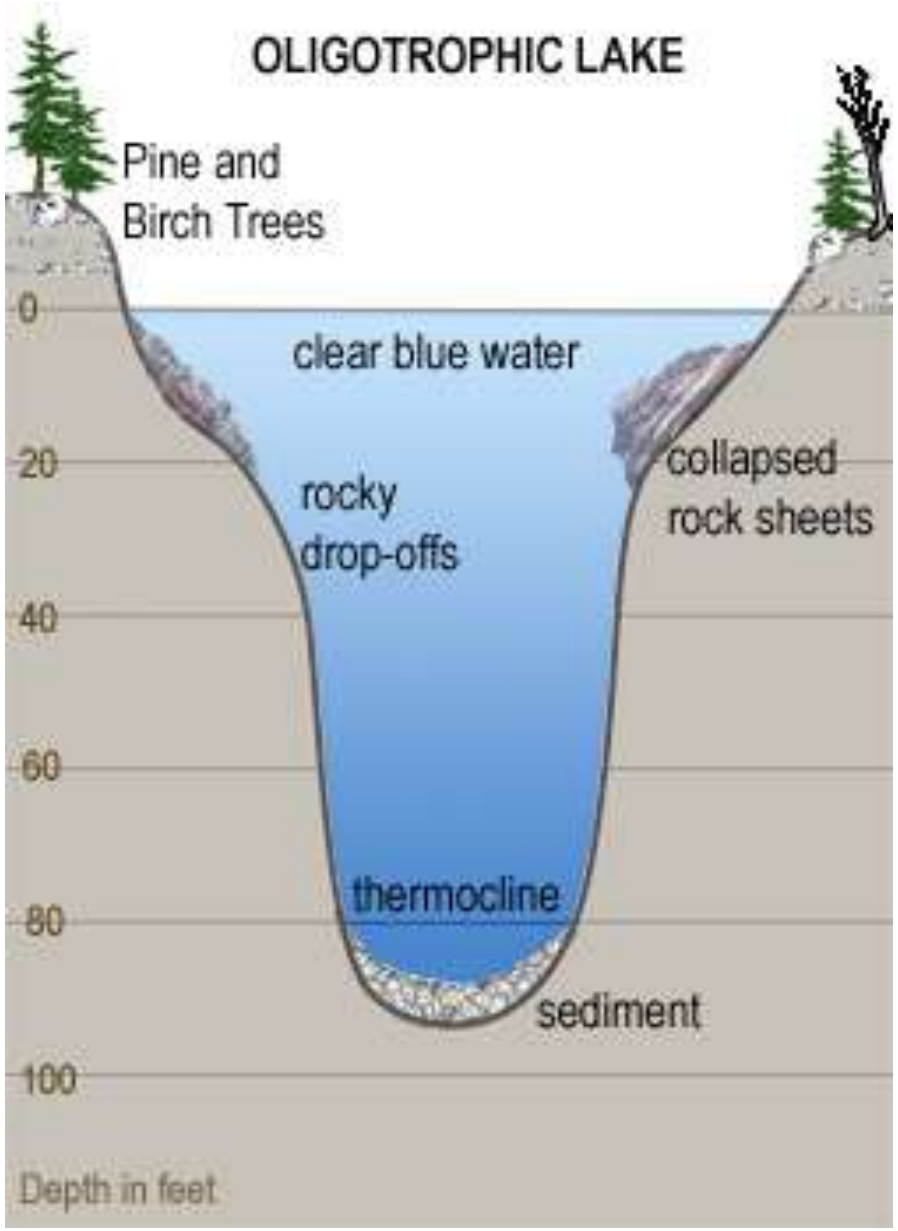
Trophic classification of lakes

Oligotrophic Lakes

These types of lakes are usually deep. They are mostly “V” shaped lakes. The lake waters are cold. These lakes are nutrient-poor and have clear, deep water. They support a limited amount of aquatic life and usually have a low abundance of algae. Examples include alpine lakes and cold lakes.

Due to the low productivity of the upper parts of the water, not much oxygen consumption occurs.

There is a narrow coastline. Wide plant belt is not seen on the shores. They are poor in phytoplankton, zooplankton, bottom fauna and nutrient salts.

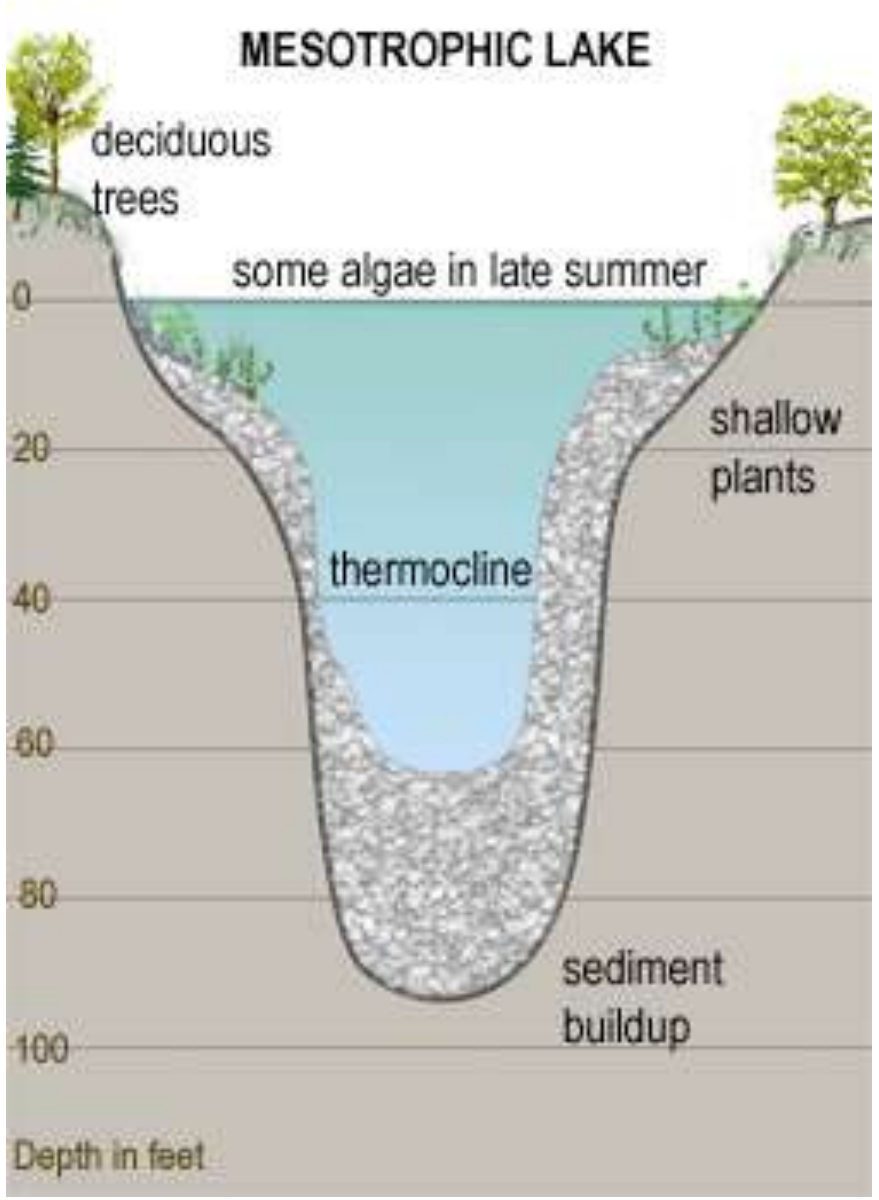


Mesotrophic Lakes

Mesotrophic lakes also have a shoreline. They are rapidly aging lakes. They are usually very productive.

They are lakes in transition from oligotrophic to eutrophic.

They are eutrophic in terms of chemical properties, but some bottom characteristics and depth are characteristic of oligotrophic lakes.

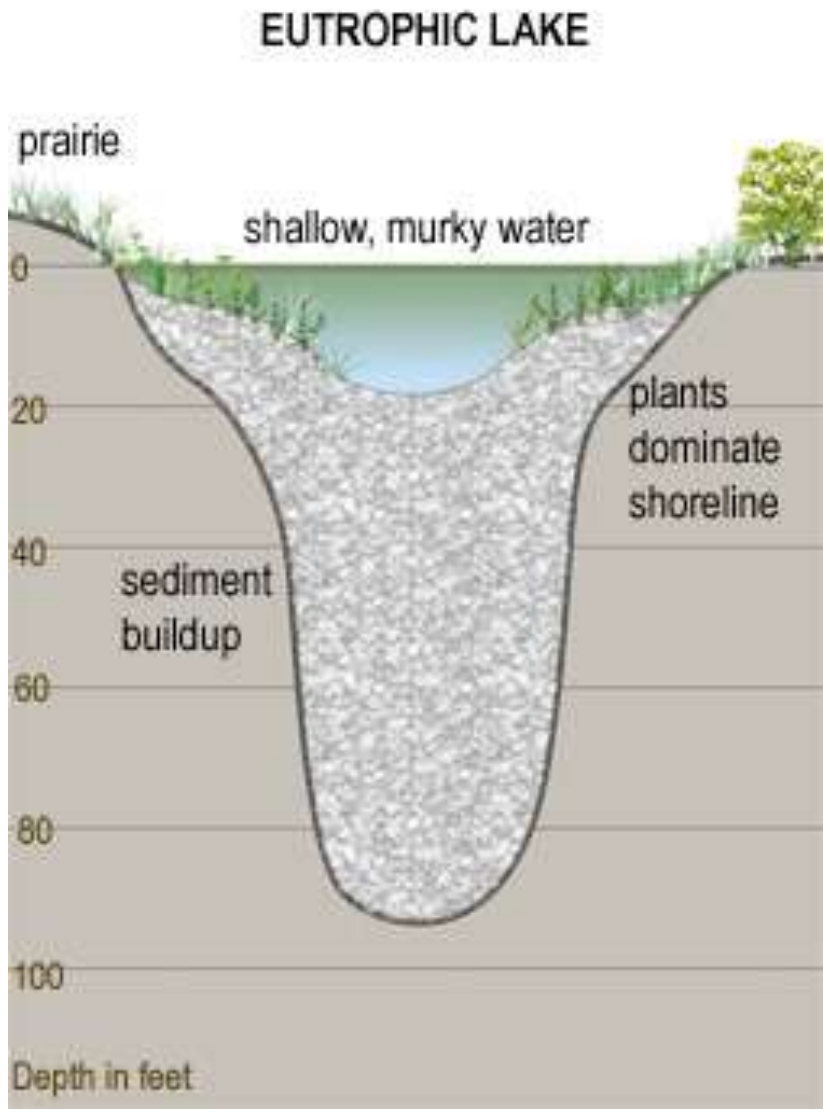


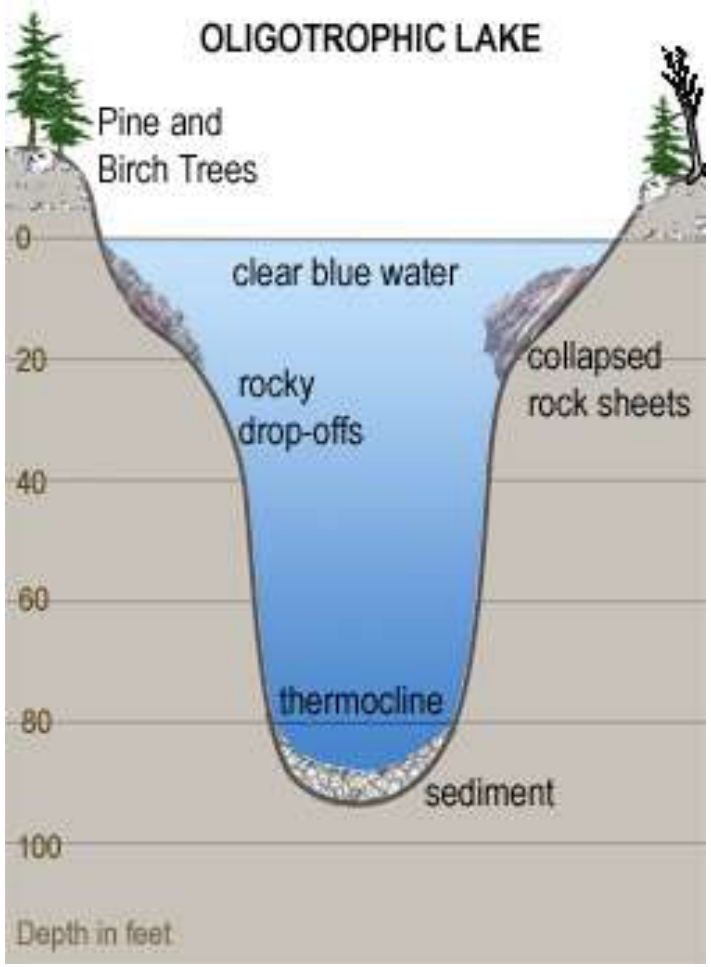
Eutrophic Lakes

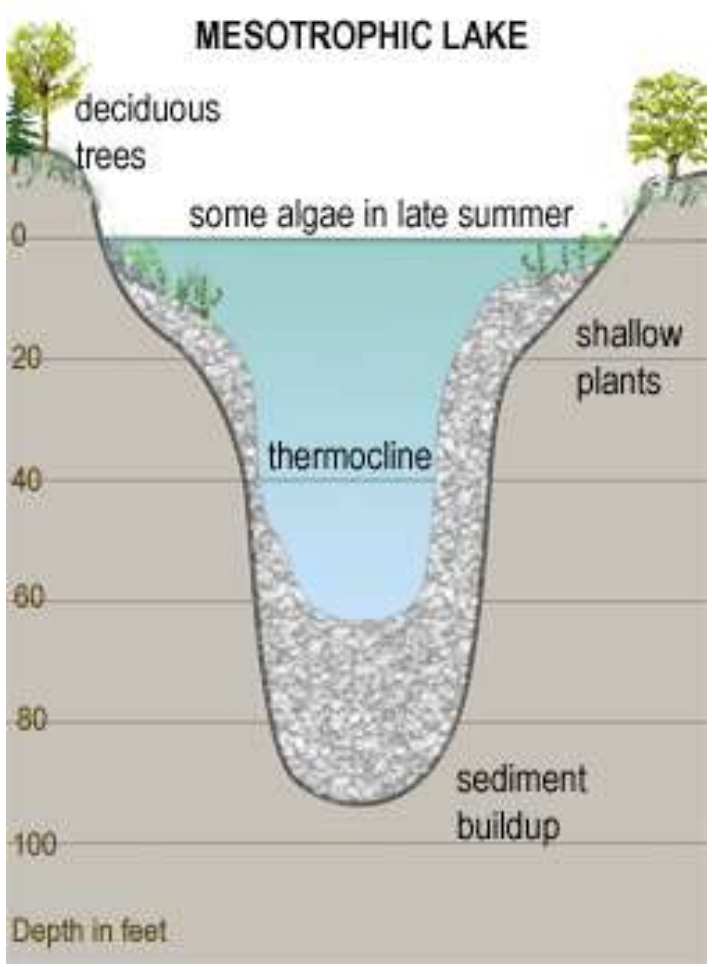
These lakes are rich in nutrients and often have shallow, turbid waters. They support a high abundance of aquatic life, including algae, and can sometimes experience algal blooms that can lead to oxygen depletion. Examples include lakes in agricultural areas and urban lakes.

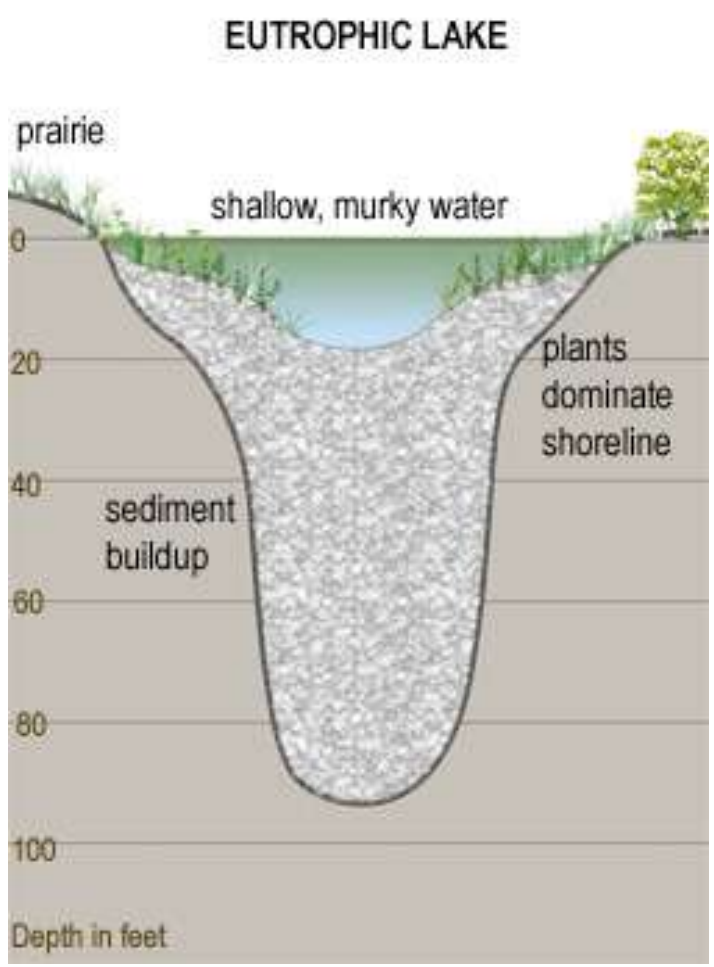
Oxygen concentration is high in the upper parts of the water. However, it drops rapidly as you go to the bottom. Sometimes there is no oxygen at all at the bottom. Fauna in eutrophic lakes is poor but rich in species. Cold water fish are not found.

They are old and flat lakes. Rich in nutrient salts, these lakes are very fertile. They are less deep, their shores are flat and coastal vegetation is very abundant. There is a layer of mud rich in organic matter on their floors. Water color is green or dark green.




OLIGOTROPHIC LAKE
Pine and
Birch Trees
0
clear blue water
20
rocky
drop-offs
collapsed
rock sheets
40
60
thermocline
80
sediment
100
Depth in feet


MESOTROPHIC LAKE
deciduous
trees
some algae in late summer
0
20
shallow
plants
thermocline
40
60
80
sediment
buildup
100
Depth in feet


EUTROPHIC LAKE
prairie
shallow, murky water
0
20
plants
dominate
shoreline
40
sediment
buildup
60
80
100
Depth in feet


OLİGOTROFİK
Düşük besin tuzu
Işık geçişi iyi
Çözünmüş oksijen miktarı fazla
Su derinliği fazla
Alg gelişimi az
Turna ve Alabalık gibi balıklar


ÖTROFİK
Yüksek besin tuzu
Işık geçişi zayıf
Çözünmüş oksijen miktarı düşük
Su derinliği az
Alg gelişimi fazla
Yayın ve Sazan gibi balıklar

Hiperötrofik Lakes

Highly productive, turbid waters are close to the wetland cycle. Many clean water organisms cannot survive here.



Distrofik lakes

These lakes are characterized by high levels of organic matter, mostly from decaying plants. They are often acidic and support a limited amount of aquatic life. Examples include marshes and reeds.

They have very low nutrient salts and high humic acid content. Humic acids or humus are black or dark brown substances formed by partially or completely decomposed plant or animal remains.



Swamp

Swamps are places where groundwater is very high, often rising to the surface, the soil is extremely wet, and water ponding is observed. Swamps are low compared to their surroundings, in the shape of a bowl-pit. Swamps are areas of damp and muddy soil that can sink when stepped on or when weighted. There are waterproof layers such as clay etc. around the swamp.



Biodiversity in Lakes Influencing Factors

Biodiversity in Lakes Influencing Factors

Factor	Impact on Biodiversity
Water Chemistry	Water salinity, pH value, oxygen level and nutrient content are important for the creatures living in lakes.
Water Temperature	Water temperature affects the metabolism and reproduction of living organisms. Since different species have specific temperature tolerances, temperature changes can affect the distribution of species. Warm lakes usually have a greater diversity of species. Species that live in warm water are different from species adapted to cold water.
Nutrient Levels	Nutrients, especially nitrogen and phosphorus, affect the productivity of the lake. High nutrient levels can lead to algal blooms, which in turn increase oxygen consumption and lower oxygen levels in the water.
Habitat diversity	Lakes with diverse habitats such as rocky shores, submerged vegetation and open water support higher species diversity.
Water depth	Water depth affects the depth of light penetration, which in turn determines the distribution of plant and animal species. Since there is more sunlight in shallow lakes, the vegetation is richer and more diverse.
Geographical location	The geographical location of lakes, such as latitude and elevation, affects water temperature, rainfall and nutrient content.
Human Activities	Pollution, overfishing and habitat changes can significantly affect lake biodiversity.



Threats to Biodiversity in Lakes Elements

Threats to Lake Environments

1

Pollution

Industrial waste, agricultural runoff and wastewater can pollute lakes, harming aquatic life and reducing water quality. Pollutants can lead to algae blooms, oxygen depletion and fish kills.

2

Overfishing

Overfishing can deplete fish populations and disrupt the lake ecosystem. Overfishing can lead to imbalances in the food web and reduced biodiversity.

3

Habitat Change

Human activities such as development of areas around the lake, conversion to agricultural land, draining wetlands, dam construction and coastal changes can alter lake habitats, can lead to habitat loss and fragmentation.

4

Climate Change

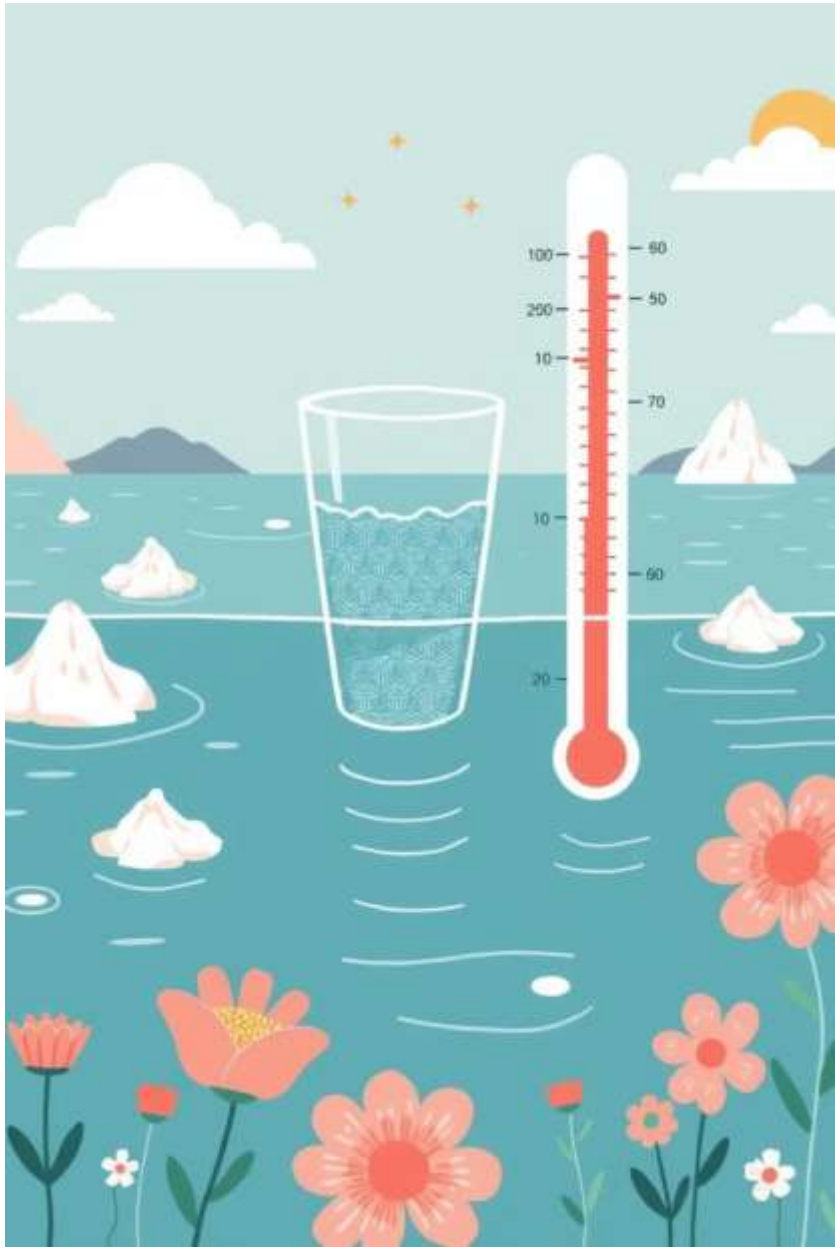
Climate change can affect lake ecosystems in several ways, altering water temperature, increasing evaporation rates and changing precipitation patterns. These changes can affect biodiversity and water quality.

5

Alien invasive species

Alien species entering lakes can compete with native species, disrupt food webs and cause ecological damage.

Impact of climate change



Impact of climate change

1

Increasing temperatures

Climate change can increase the water temperature of lakes, shrinking the habitat of some species and creating favorable conditions for some invasive species. In addition, warm water reduces dissolved oxygen levels, which threatens the survival of fish and other aquatic life.

2

Changes in Rainfall Regime

Changes in rainfall can affect the water level of lakes, negatively impacting biodiversity. A drop in water levels can lead to habitat loss and species extinction.

3

Increased Evaporation

Climate change leads to drought and increased evaporation, lowering the water level of lakes, causing habitat loss and reducing the diversity of species. The increase in salinity in the virinity with evaporation can cause stress for living organisms.



Impact of climate change

4

Acidification of water

Climate change increases acid rain, lowering the pH of lakes. Acidic water affects the respiration of aquatic organisms and impairs water quality.

Effects of Alien Invasive Species on Lake Biodiversity

Effects of Alien Invasive Species on Lake Biodiversity

Alien invasive species can cause great damage to natural biodiversity in lakes. Since these species lack natural predators in new environments, they can multiply rapidly and outcompete and destroy native species. Invasive species can disrupt the food chain, alter habitats and upset the ecological balance of lakes.





Impact of Alien Invasive Species on Lakes

Fish Species

Alien fish species can compete with native fish species and disrupt the food chain.

Plant Species

Alien aquatic plants can inhibit the growth of native plants and affect water quality.

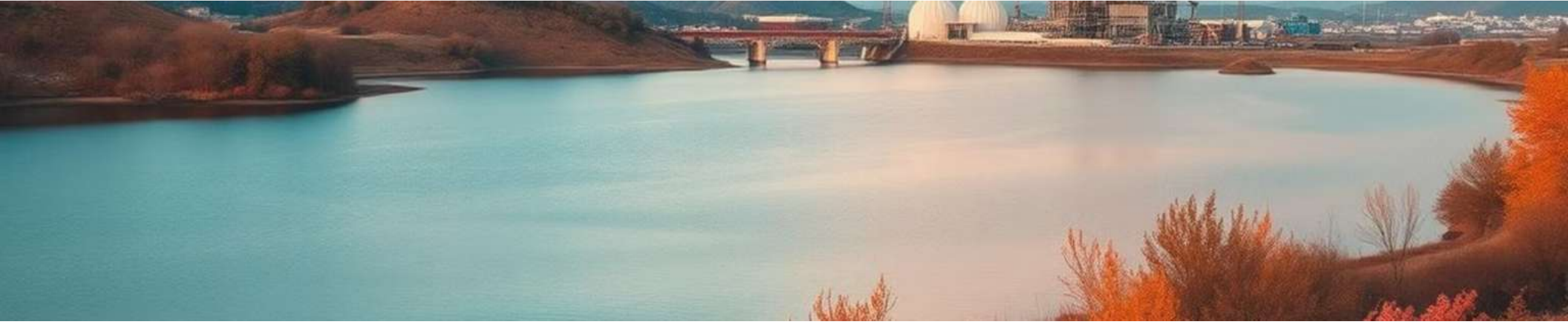
Shellfish

Alien shellfish can damage the lake ecosystem and clog water pipes, leading to economic losses.

Insect Species

Alien insect species can disturb the biological balance of the lake and cause diseases.

Impact of Human Activities on Lakes



Impact of Human Activities on Lakes

1 Water Use

Excessive use of lake waters for purposes such as irrigation, industry and drinking water can lead to a reduction in lake levels and loss of wetlands.

2 Shoreline Development

Development of lake shores can lead to habitat loss, deterioration in water quality and disrupt the natural balance of the lake.

3 Agriculture Activities

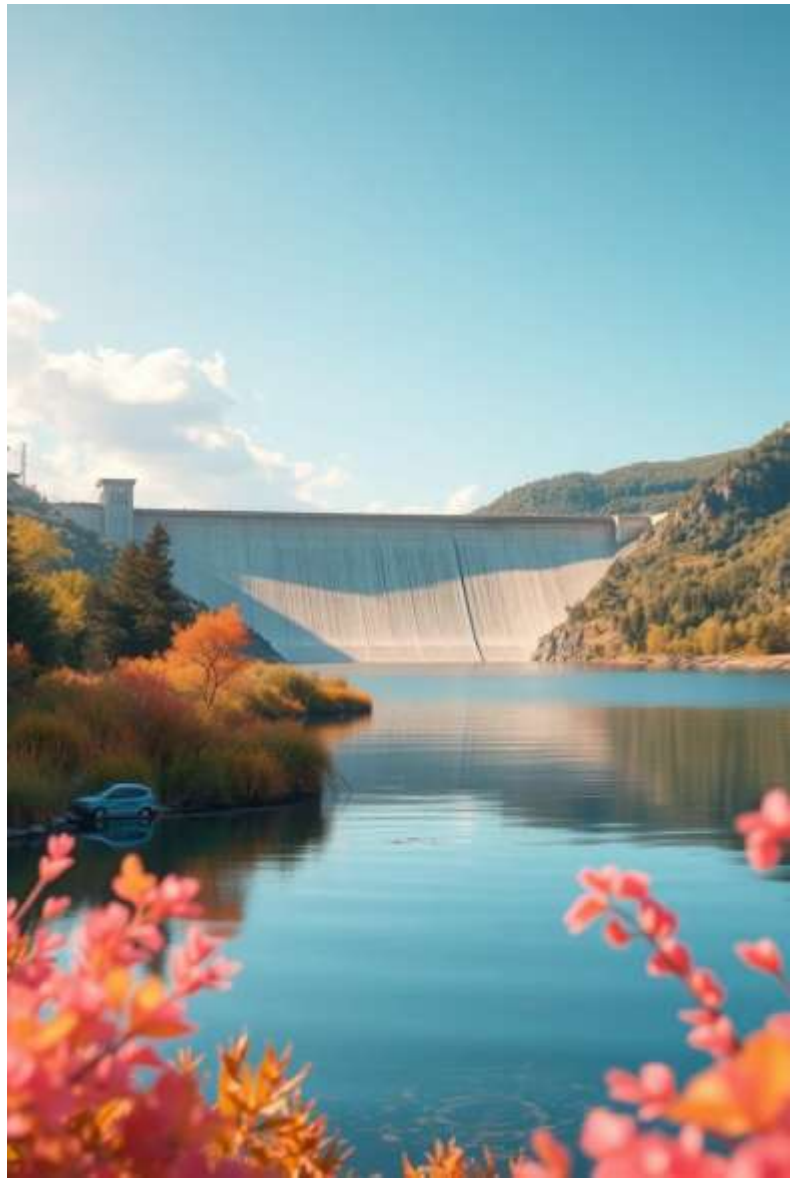
Agricultural runoff can cause fertilizers and pesticides to enter lakes. This pollution can lead to algal blooms and reduced water quality.

Impact of Human Activities on Lakes

Human activities affect the ecosystems and biodiversity of lakes in various ways.

Factors such as water pollution, habitat loss, overfishing, the introduction of invasive species and climate change threaten the health and sustainability of lakes.

In order to protect the health of lakes, measures such as sustainable water management practices, reducing pollution, habitat conservation efforts and controlling invasive species need to be taken.



Importance and utilization of lake ecosystems

Importance and utilization of lake ecosystems

Water Source

Lakes serve as important sources of fresh water for human consumption, agriculture and industry. They also play vital roles in regulating water flow and replenishing groundwater.

Habitat for Wildlife

Lakes provide essential habitat for a variety of plants and animals, including fish, birds, amphibians, reptiles and mammals. They support complex food webs and contribute to overall biodiversity.

Fishing, Transportation, Recreation

Lakes are popular recreation and tourism destinations, offering opportunities for fishing, boating, swimming and enjoying the beauty of the landscape. They contribute to local economies and provide health benefits.

Climate Regulation

Lakes influence the local climate by stabilizing temperatures and regulating humidity. They also store and release heat, affecting weather patterns and atmospheric circulation.



Human Use of Lakes



Fishing

Lakes provide an important resource for fisheries. However, overfishing can threaten fish populations.



Recreational Activities

Lakes are ideal places for various recreational activities such as swimming, canoeing, fishing and hiking.



Drinking Water Source

Many lakes are used as a source of drinking water for the communities around them. Protecting water quality is vital for human health.

Human Use of Lakes



Energy production

Lakes and rivers play an important role in electricity generation by using water power in hydroelectric power plants



Industrial use

It is used as cooling water in factories.



Irrigation

It is used as irrigation water in agriculture.

Lake Ecosystem Functions

Lake Ecosystem Functions

1 Water Treatment

Lakes act as natural filters, purifying water from pollutants and sediments.

2 Nutrient Cycle

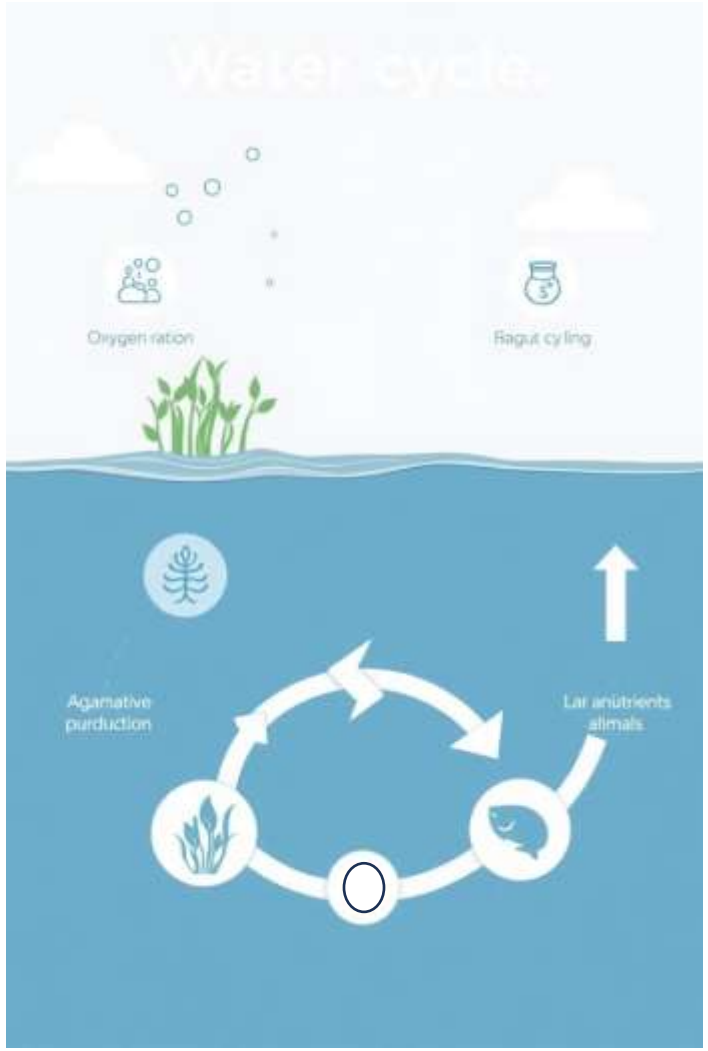
Lakes play a vital role in cycling essential nutrients such as nitrogen and phosphorus through the food web.

3 Habitat Provision

Lakes offer a variety of habitats for various plants and animals, contributing to biodiversity.

4 Climate Regulation

Lakes influence the local climate by regulating temperature and humidity.



Protection and Management of Lakes

Protection and Management of Lakes

Water Quality Monitoring

Regular monitoring of water quality is essential to identify and address pollution problems. This ensures that lakes remain healthy and support diverse ecosystems.

Sustainable Fishing Practices

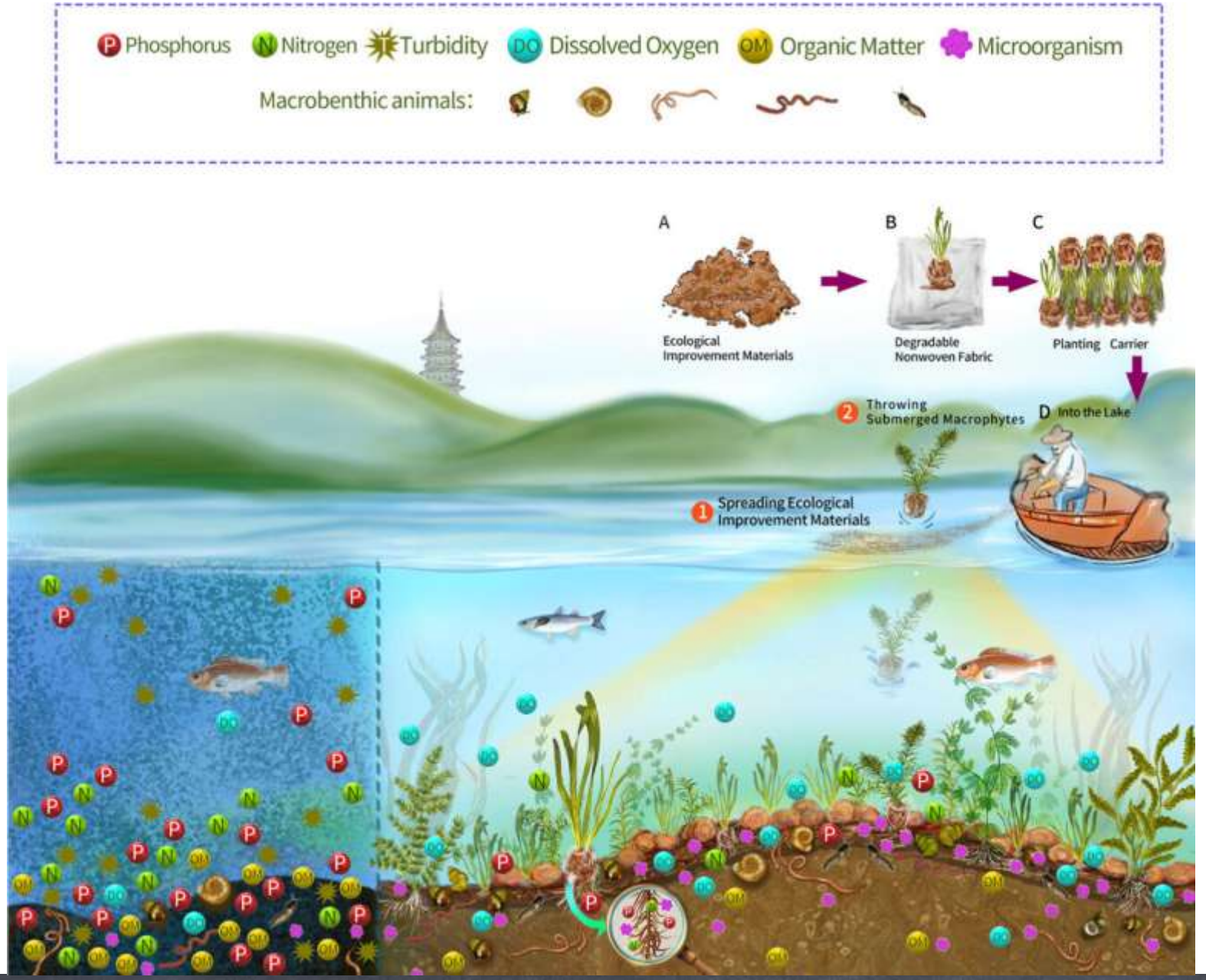
Enforcing fishing regulations and promoting sustainable fishing practices can help protect fish populations and maintain healthy lake ecosystems. These practices include catch limits, size restrictions and fisheries.

Habitat Restoration

Restoring degraded habitats, such as planting native vegetation, restoring wetlands and controlling invasive species, can increase lake biodiversity and improve water quality.

Public Education and Awareness

Raising public awareness about the importance of lakes and the threats they face is vital to promote conservation efforts. Education can enable individuals to make responsible decisions to protect lake ecosystems.


Phosphorus
Nitrogen
Turbidity
Dissolved Oxygen
Organic Matter
Microorganism
Macrobenthic animals:
A
B
C
Ecological Improvement Materials
Degradable Nonwoven Fabric
Planting Carrier
D Into the Lake
2 Throwing Submerged Macrophytes
1 Spreading Ecological Improvement Materials

Conclusions and Recommendations



Conclusions and Recommendations

Lakes are vital ecosystems that support diverse life forms and provide valuable services to people. It is vital to protect lake ecosystems through sustainable practices, responsible resource management and addressing pollution to preserve their health and ecological integrity for future generations.

Thank you



What topics are you curious about and what are your questions?



Göllerde Yaşam.



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WHEN SCIENTIST GO UNDER THE WATER

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Thank you

Bizi sosyal medyada takip edin!

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