CBSE Class 12 Biology Notes Chapter 15: In Chapter 15 of the CBSE Class 12 Biology syllabus focuses on biodiversity and its crucial role in sustaining ecosystems and human life. Biodiversity encompasses the variety of living organisms, including species diversity, genetic diversity and ecosystem diversity.

By studying these notes students will gain a deeper understanding of the need for conservation efforts, both in situ (conservation of species in their natural habitats) and ex situ (conservation of species in controlled environments like zoos and botanical gardens). By going through these notes, students can strengthen their understanding of the chapter's concepts and learn more about Biodiversity and Conservation.

CBSE Class 12 Biology Notes Chapter 15 Biodiversity and Conservation Overview

These notes are important for understanding the important concepts of biodiversity and conservation as they are prepared by subject experts from Physics Wallah.

By studying these notes, students can learn about the serious problems of losing biodiversity and why we need to take action to conserve our environment.

CBSE Class 12 Biology Notes Chapter 15 Biodiversity and Conservation PDF

You can access the **CBSE Class 12 Biology Notes for Chapter 15 Biodiversity and Conservation** by clicking the link below. This PDF contains detailed explanations and key points that will help you understand the importance of biodiversity its different types and the conservation methods we can adopt to protect our planet. By reviewing these notes you will gain a clearer insight into the challenges facing biodiversity and the steps needed to ensure its preservation for future generations.

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Below we have provided CBSE Class 12 Biology Notes Chapter 15 Biodiversity and Conservation-

Introduction to Biodiversity

Biodiversity, or biological diversity, refers to the variety of ecosystems, species of organisms, and their variations such as biotypes, ecotypes and genes that are adapted to different climates and environments. This term was coined by Edward Wilson and encompasses the vast array of microorganisms, algae, fungi, plants, and animals found on Earth, whether in terrestrial or aquatic habitats. Biodiversity includes the ecological complexes to which these organisms belong and ranges from macromolecules to entire biomes.

Levels of Biological Diversity

Biodiversity can be categorized into three main levels of biological organization:

I. Genetic Diversity

Genetic diversity refers to the variation in genetic composition among individuals within a single species. For example, Rauwolfia vomitoria exhibits genetic variation in the concentration and potency of the chemical reserpine. India alone boasts more than 50,000 genetically different strains of rice and about 1,000 varieties of mango.

II. Species Diversity

Species diversity refers to the variety of species within a specific region. An example of this is seen in the Western Ghats, which has a higher diversity of amphibian species compared to the Eastern Ghats.

III. Ecological Diversity

Ecological diversity encompasses the different types of ecosystems present in the environment. This includes deserts, rainforests, mangroves, coral reefs, wetlands, estuaries and alpine meadows.

Importance of Biodiversity and Conservation

Biodiversity and its conservation are crucial environmental issues that have gained international attention. As awareness of the importance of biodiversity for survival and well-being increases, more people recognize its significance on our planet.

- According to the International Union for Conservation of Nature (IUCN), approximately 1.5 million plant and animal species have been described so far, but many more species remain to be discovered and described.
- Of the recorded species, over 70% are animals, while the remainder consists of plants, including algae, fungi, bryophytes, gymnosperms, and angiosperms. Among animals, insects make up about 70% of the total species count.
- The number of fungi species in the world exceeds the combined total of fish, amphibians, reptiles and mammals.

Biodiversity in India

India stands out as one of the twelve mega biodiversity countries in the world. Despite covering only 2.4% of the global land area, India is home to approximately 8.1% of the world's species biodiversity. The country boasts about 45,000 species of plants and between 90,000 and 100,000 species of animals. However, many new species remain to be discovered and named. According to Robert May's global estimate, only 22% of total species have been recorded, indicating that India likely has more than 100,000 species of plants and around 300,000 species of animals yet to be discovered and described.

Patterns of Biodiversity

a) Latitudinal Gradients

The diversity of plants and animals is not uniform across the globe; it shows an uneven distribution along latitudinal gradients. Species diversity decreases as we move from the equator towards the poles. Tropical regions, such as the Amazonian Rainforest, harbor a greater variety of species than temperate or polar areas. The Amazon Rainforest alone is home to more than 40,000 species of plants, 125,000 species of insects, 300 species of fish, 427 species of amphibians, 378 species of reptiles, 1,300 species of birds and 427 species of mammals.

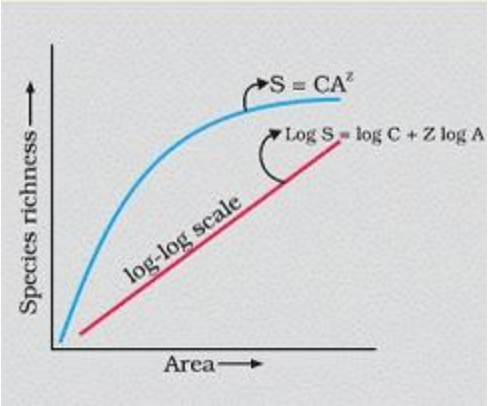
Several hypotheses explain this biodiversity pattern:

1. **Time and Speciation**: Unlike temperate regions, which have experienced frequent glaciations, tropical latitudes have remained relatively undisturbed for millions of years, providing a long evolutionary time frame for species diversification.
2. **Environmental Stability**: Tropical environments are less seasonal and more constant than temperate ones, promoting niche specialization and resulting in greater species diversity.
3. **Solar Energy**: The tropics receive more solar energy, which contributes to higher productivity and indirectly supports greater diversity.

b) Species-Area Relationships

Alexander Von Humboldt noted that within a region, species richness increases with the explored area, but only to a certain limit. The relationship between species richness and area for various taxa, such as angiospermic plants, freshwater fishes and birds, is represented as a rectangular hyperbola.

On a logarithmic scale, this relationship is expressed by the equation:



On logarithmic scale, the relationship is a straight line described by the equation-

log S = log C + Z log A.

Where, S= species, A= Area, Z= slope of the line, C =Y- intercept.

- Ecologists have discovered that the value of Z lies in range of 0.1 to 0.2 regardless of taxonomic group of the region.
- In very large area like continents, Z value ranges between 0.6 & 1.2.

The Importance of Species Diversity to the Ecosystem

Species diversity plays a critical role in maintaining the stability and health of ecosystems. Communities with a greater number of species tend to be more stable than those with fewer species. A stable ecosystem is characterized by minimal fluctuations in productivity from year to year, which is essential for sustaining both natural environments and human life.

Rich biodiversity is vital for ecosystem health and is imperative for the survival of the human race on this planet. One of the key concepts illustrating the significance of species diversity is the **Rivet Popper Hypothesis**, proposed by Paul Ehrlich. This hypothesis compares an ecosystem to an airplane, where all parts are held together by thousands of rivets (species). If passengers (species) start popping rivets (causing extinctions) to take home, the airplane may continue to function initially without immediate danger. However, as more rivets are removed, the plane becomes increasingly weak over time. Moreover, the removal of specific rivets can have varying consequences: losing rivets from critical areas, like the wings (key species essential for major ecosystem functions), poses a greater threat to flight safety than removing rivets from less critical areas.

Loss of Biodiversity

Unfortunately, the biological wealth of our planet has been declining rapidly due to three primary factors: population growth, urbanization, and industrialization. According to the **IUCN Red List (2004)**, 784 species have gone extinct over the last 500 years, including 338 vertebrates, 359

invertebrates, and 87 plant species. Notable recent extinctions include the dodo from Mauritius, the quagga from Africa, the thylacine from Australia, and Steller's sea cow from Russia. Additionally, three subspecies of tigers (Bali, Javan, and Caspian) have also vanished. In the past 20 years alone, 27 species have disappeared.

The loss of biodiversity in a region can have several detrimental effects:

1. **Decline in Plant Production**: Fewer species can lead to reduced overall productivity, impacting food supply and ecosystem function.
2. **Lowered Resistance to Environmental Changes**: Ecosystems with less diversity are more vulnerable to disturbances such as droughts and floods, making them less resilient to change.
3. **Increased Variability in Ecosystem Processes**: A decline in species diversity can lead to unpredictable fluctuations in processes such as productivity, water usage and pest and disease cycles, ultimately threatening ecosystem stability.

Causes of Biodiversity Losses

The accelerated rates of species extinctions are primarily attributed to human activities, often referred to as **"The Evil Quartet."** These four major causes significantly impact biodiversity:

1. Habitat Loss and Fragmentation

Habitat loss and fragmentation are considered the most critical causes of extinction for both animals and plants. Large habitats, such as the Amazon rainforest, often called the "lungs of the planet," are being cut down and cleared for agricultural purposes, like cultivating soybeans or converting forests into grasslands. This fragmentation disrupts the natural habitats, making it challenging for animals, especially mammals and birds that require large territories, to migrate and thrive.

2. Over-Exploitation

Over-exploitation occurs when humans excessively harvest natural resources, leading to degradation and potential extinction. Examples include the extinction of the **Steller's sea cow** and the **passenger pigeon**. Many marine fish populations face overharvesting, which threatens the survival of essential species and disrupts marine ecosystems.

3. Alien Species Invasions

The introduction of alien species—whether intentional or accidental can lead to declines or extinctions of indigenous species. Invasive species, such as the **Nile perch** introduced into Lake Victoria, have caused the extinction of over 200 unique cichlid fish species. Additionally, invasive weeds like **parthenium**, **Lantana** and **water hyacinth** threaten the survival of native species by outcompeting them for resources.

4. Co-Extinctions

Co-extinction occurs when one species becomes extinct, leading to the extinction of other species that are closely associated with it. For instance, if a host fish species disappears, its specific parasites and symbiotic organisms may also become extinct disrupting the balance of the ecosystem.

Biodiversity Conservation

Conserving biodiversity is essential for various reasons:

I. The Narrowly Utilitarian

Humans derive numerous direct economic benefits from nature, including food, firewood, fibers, construction materials, medicinal plants, and industrial products. By investing in **bio-prospecting** the exploration of biodiversity for new resources countries rich in biodiversity can anticipate significant economic gains.

II. The Broadly Utilitarian

Biodiversity is crucial for the ecosystem services that nature provides. These include oxygen production during photosynthesis, natural pollination and the overall enjoyment of nature. Such services are invaluable and contribute to the well-being of all life on Earth.

III. Ethical Considerations

Conserving biodiversity also involves ethical responsibilities. We owe it to the millions of plants, animals, and microorganisms with whom we share the planet to protect their existence. Each species has intrinsic value, regardless of its current economic worth. It is our moral obligation to care for their well-being and ensure that we pass on our biological legacy in a healthy state to future generations.

How Do We Conserve Biodiversity?

Conserving biodiversity is vital for maintaining healthy ecosystems and ensuring the survival of various species. There are two primary methods for biodiversity conservation:

1. In Situ (On-Site) Conservation

In situ conservation focuses on protecting ecosystems and their biodiversity in their natural habitats. Conservationists have identified certain regions known as **biodiversity hotspots**, which are characterized by high levels of species richness and endemism species that are found only in those specific areas. There are 34 recognized biodiversity hotspots globally, many of which are also facing accelerated habitat loss.

In India, several measures have been implemented for in situ conservation, including:

- **Biosphere Reserves**: India has 14 biosphere reserves aimed at conserving both biodiversity and the cultural heritage of the area.
- **National Parks**: There are 90 national parks that protect various ecosystems and the species within them.
- **Wildlife Sanctuaries**: India has 448 wildlife sanctuaries that provide safe habitats for threatened and endangered species.

2. Ex Situ (Off-Site) Conservation

Ex situ conservation involves the removal of threatened species from their natural habitats and placing them in controlled environments where they can receive protection and care. This method allows for the preservation of genetic diversity and helps ensure the survival of species at risk of extinction. Some common ex situ conservation methods include:

- **Zoological Parks**: Zoos house animals in safe environments and contribute to breeding programs for endangered species.
- **Botanical Gardens**: These gardens conserve plant species, particularly those that are rare or threatened.
- **Wildlife Safari Parks**: These parks provide larger, more natural habitats for animals, allowing for more natural behaviors.

Advanced techniques, such as **cryopreservation**, are also used to preserve gametes (sperm and eggs) of threatened species in viable and fertile conditions for extended periods. **In vitro fertilization** and **tissue culture methods** are employed for propagating plants and ensuring their survival.

***In situ* conservation**	***Ex situ* conservation**
This method involves protection of endangered species in their natural habitat.	It involves placing of threatened animals and plants in special care unit for their protection.
It helps in recovering populations in the surroundings where they have developed their distinct features.	It helps in recovering populations or preventing their extinction under stimulated conditions that closely resemble their natural habitats.
e.g. national parks, biosphere reserves, wildlife sanctuaries, etc.	e.g. botanical garden, zoological parks.

Global Commitments to Biodiversity Conservation

Significant international efforts have been made to promote biodiversity conservation. The historic **Convention on Biological Diversity**, known as **The Earth Summit**, was held in Rio de

Janeiro in 1992. It called upon nations to implement measures for conserving biodiversity. At the **World Summit on Sustainable Development** in 2002, representatives from 190 countries pledged their commitment to achieving a significant reduction in biodiversity loss by 2010 at global, regional, and local levels.

Benefits of CBSE Class 12 Biology Notes Chapter 15 Biodiversity and Conservation

- **Comprehensive Understanding**: The notes provide a thorough overview of biodiversity and conservation, helping students grasp the key concepts, definitions and importance of biodiversity in ecosystems.
- **Structured Learning**: The notes are organized into clear sections, making it easier for students to follow the information and locate specific topics quickly such as types of biodiversity, patterns and conservation methods.
- **Critical for Exams**: Understanding the principles of biodiversity and conservation is important for CBSE Class 12 Biology exams, as it often includes questions related to these topics. The notes help students prepare effectively.
- **Real-World Relevance**: The content connects theoretical knowledge to real-world issues, emphasizing the significance of biodiversity for environmental health and human well-being, which can inspire students to care for the environment.
- **Simplified Language**: The notes use simple and clear language, making complex biological concepts more accessible to students enhancing their comprehension and retention of information.
- **Preparation for Future Studies**: A solid understanding of biodiversity and conservation lays the groundwork for students interested in pursuing further studies in environmental science, ecology or related fields.