INDIAN SCHOOL AL WADI AL KABIR		
CLASS: XII	**DEPARTMENT: SCIENCE 2026 – 2027** **SUBJECT: BIOLOGY**	**DATE: 08/11/2026**
WORKSHEET NO. 13	**UNIT- X- ECOLOGY** **CHAPTER:13- BIODIVERSITY AND CONSERVATION**	**NOTE:** **A4 FILE FORMAT**
CLASS & SEC:	**NAME OF THE STUDENT:**	**ROLL NO.**

I. OBJECTIVE-TYPE QUESTIONS

1. Which of the following taxonomic groups has the highest number of species among invertebrates?
   A. Molluscs
   B. Crustaceans
   C. Insects
   D. Echinoderms
2. As we move from the equator towards the poles, species diversity generally:
   A. Increases
   B. Decreases
   C. Remains constant
   D. First decreases then increases
3. For frugivorous (fruit-eating) birds and mammals in the tropical forests of different continents, the slope of the species-area relationship line (Z) is found to be:
   A. 0.1 to 0.2
   B. 0.6 to 1.2
   C. 1.15
   D. 0.5 to 0.7
4. Which of the following is an example of a "Sacred Grove" used for *in-situ* conservation in India?
   A. Western Ghats of Karnataka
   B. Khasi and Jaintia Hills in Meghalaya
   C. National Botanical Garden, Lucknow
   D. Jim Corbett National Park
5. The introduction of which alien species into Lake Victoria in East Africa led to the extinction of an ecologically unique assemblage of more than 200 species of cichlid fish?
   A. African Catfish (*Clarias gariepinus*)
   B. Nile Perch
   C. Water Hyacinth (*Eichhornia crassipes*)
   D. Lantana camara

II. ASSERTION AND REASONING

For the following questions, two statements are given, one labelled Assertion (A) and the other

labelled Reason (R). Select the correct answer to these questions from the codes (i), (ii), (iii), and (iv) as given below:

A. Both A and R are true, and R is the correct explanation of the assertion.

B. Both A and R are true, but R is not the correct explanation of the assertion

C. A is true, but R is false.

D. A is false, but R is true

6. **Assertion (A):** Communities with more species tend to be more stable than those with fewer species.
   Reason (R): David Tilman's long-term ecosystem experiments showed that plots with more species showed less year-to-year variation in total biomass.

7. **Assertion (A):** Tropics harbour more species than temperate or polar areas.
   Reason (R): Tropical environments, unlike temperate ones, are less seasonal, relatively more constant, and predictable, which promotes niche specialisation.

8. **Assertion (A):** The illegal introduction of the African catfish *Clarias gariepinus* for aquaculture purposes is posing a threat to the indigenous catfishes in our rivers.
   Reason (R): Introduction of alien species always results in the co-extinction of obligate mutualistic native species.

III. VERY SHORT QUESTIONS (2M):

9. State two major differences between *In-situ* and *Ex-situ* conservation strategies.
10. Name the three levels of biodiversity conceptualised by popular sociologist Edward Wilson.

IV. SHORT ANSWER TYPE QUESTIONS: (3M)

11. Differentiate between the three arguments for conserving biodiversity: Narrowly Utilitarian, Broadly Utilitarian, and Ethical.
12. India is one of the 12 mega-diversity countries of the world. Justify this statement using statistical facts and figures.

V. SOURCE-BASED/ CASE STUDY-BASED QUESTIONS:

The Amazon rainforest in South America is so immense that it is called the "lungs of the planet." It harbors the greatest biodiversity on Earth, being home to more than 40,000 species of plants, 3,000 species of fish, 1,300 species of birds, 427 species of mammals, 427 species of amphibians, 378 species of reptiles, and more than 1,25,000 species of invertebrates. Scientists estimate that in these rain forests, there might be at least two million insect species waiting to be discovered and named.

However, this massive reservoir of life is facing severe threats due to human activities. It is being cut and cleared for cultivating soya beans or for conversion to grasslands for raising beef cattle. When large habitats are broken into smaller fragments due to various human activities, mammals and birds requiring large territories and certain animals with migratory habits are badly affected, leading to population declines. This represents the most dramatic example of habitat loss and fragmentation—the most important cause driving animals and plants to extinction.

A. Why is the Amazon rainforest referred to as the "lungs of the planet"?

B. What are the two main human activities driving the clearing and destruction of the

Amazon rainforest?

C. Which major component of the "Evil Quartet" is highlighted when the passage describes large habitats being broken down into smaller pieces, and which types of animals are worst hit by it?

D. Based on the species statistics given in the text, arrange the following vertebrate groups found in the Amazon rainforest in descending order of their species richness: Amphibians, Birds, Fishes, Reptiles.

VI. LONG ANSWER TYPE QUESTIONS. (5M)

13. A. Explain the species-area relationship documented by Alexander von Humboldt. Write its linear equation on a logarithmic scale and define each variable used.

B. What is the "Evil Quartet"? Briefly explain any two components.

VII. BOARD QUESTIONS

14. Mention recent species extinctions recorded in the IUCN Red List from (i) Mauritius, (ii) Russia, and (iii) Australia. *(CBSE 2020)*

15. Which component of an ecosystem does genetic diversity directly impact? (CBSE 2025)

A. Ecosystem diversity
B. Species diversity
C. Latitudinal gradient
D. Ecological stability

16. How does Paul Ehrlich's *Rivet Popper Hypothesis* explain the role of producers and key species in ecosystem stability? (CBSE 2025)

ANSWER KEY		
I. OBJECTIVE-TYPE QUESTIONS		
1.	C. Insects	
2.	B. Decreases	
3.	C. 1.15	
4.	B. Khasi and Jaintia Hills in Meghalaya	
5.	A. African Catfish (*Clarias gariepinus*)	
II. **ASSERTION AND REASONING**		
6.	A. Both A and R are true, and R is the correct explanation of the assertion	
7.	A. Both A and R are true, and R is the correct explanation of the assertion.	
8.	C. A is true, but R is false.	
III. VERY SHORT ANSWER TYPE QUESTIONS: (2M)		
9.	In-situ Conservation	Ex-situ Conservation
	On-site protection: Animals and plants are protected in their natural habitats without moving them.	Off-site protection: Endangered species are removed from their natural habitats and protected in man-made enclosures.
	Protects the entire ecosystem: The strategy safeguards the whole ecosystem and its natural processes along with the species (e.g., National Parks, Wildlife Sanctuaries, Biosphere Reserves).	Protects specific species: The strategy focuses specifically on saving targeted threatened species or their genetic material (e.g., Zoological Parks, Botanical Gardens, Seed Banks).

10.	The three levels of biodiversity conceptualized by Edward Wilson are: • **Genetic diversity:** Variation of genes within a single species (e.g., genetic variations in *Rauwolfia vomitoria*). • **Species diversity:** Variety and richness of different species in a specific region (e.g., the Western Ghats having a greater amphibian species diversity than the Eastern Ghats). • **Ecological diversity:** Variety of ecosystems present in a geographical area (e.g., deserts, rainforests, and mangroves creating high ecosystem diversity in India).
IV. SHORT ANSWER TYPE QUESTIONS (3M)	
11.	• Narrowly Utilitarian Argument: This is based on direct, tangible economic benefits that humans derive from nature. It includes essential commercial resources such as food (cereals, pulses), construction materials (timber, fiber), industrial products (tannins, lubricants), and medicinal drugs. • Broadly Utilitarian Argument: This is based on indirect, invaluable ecosystem services provided by nature that maintain the global life-support system. Examples include the production of oxygen (like the Amazon rainforest), pollination of crops by insects, climate regulation, and aesthetic or spiritual pleasures. • Ethical Argument: This is based on the intrinsic value of all living organisms, completely independent of their economic utility to humans. It states that every species has a right to exist, and humans have a moral obligation to protect them and pass on a healthy biological legacy to future generations.
12.	• Land vs. Species Ratio: Although India has only 2.4 percent of the world's land area, its share of the global species diversity is an impressive 8.1 percent. • Recorded Species Wealth: India is home to nearly 45,000 species of plants and twice as many species of animals (around 90,000 to 91,000) discovered and recorded so far. • Global Status: Because of this immense concentration of flora and fauna, India ranks among the 12 megadiversity countries of the world. Applying Robert May's global estimate suggests that more than 1,000,000 insect/animal species and 30,000 plant species are yet to be discovered here.
V. SOURCE-BASED/ CASE STUDY-BASED QUESTIONS	
	A. It is called the "lungs of the planet" because its massive, dense vegetation acts as a giant carbon sink. Through the process of photosynthesis, this vast ecosystem produces an estimated 20 percent of the total oxygen in the Earth's atmosphere.
	B. The forest is being cut and cleared primarily for the large-scale cultivation of soybeans. It is also being rapidly cleared for conversion into extensive grasslands used for raising beef cattle (cattle ranching).
	C. This describes Habitat Loss and Fragmentation, which is a primary driver of modern ecological apocalypse. Mammals and birds requiring large territories, as well as migratory animals, are the worst hit by this disruption.
	D. The correct descending order based on statistics is Fishes > Birds > Amphibians = Reptiles (or Reptiles > Amphibians according to updated metrics). In the standard text data, fishes lead with 3,000+ species, followed by birds (1,300), reptiles (427), and amphibians (427).

VI. LONG ANSWER TYPE QUESTIONS. (5M)	
13.	A. • German naturalist Alexander von Humboldt observed that within a region, species richness increases with increasing explored area, but only up to a limit. On a normal graph, this relationship plots as a rectangular hyperbola. • **Logarithmic Equation:** On a logarithmic scale, the relationship becomes linear and is expressed by the equation: (log S=log C+Z log A) • **Variable Definitions:** o **(S)** = Species richness (number of different species in the area) o **(A)** = Area explored o **(Z)** = Slope of the line (regression coefficient) o **(C)** = Y-intercept The **"Evil Quartet"** is a term used to describe the four major causes of accelerated species extinction and biodiversity loss driven by human activities. *Any two components explained:* 1. **Habitat Loss and Fragmentation:** This is the primary cause of extinction; large habitats are cut down or broken into small fragments due to human encroachment, severely threatening mammals, birds, and migratory animals. 2. **Over-Exploitation:** When human economic greed turns into need, it leads to the over-harvesting of natural resources, resulting in the extinction of species like the Steller's sea cow and passenger pigeon.
VII. BOARD QUESTIONS	
14.	(i) Mauritius: Dodo (ii) Russia: Steller's Sea Cow (iii) Australia: Thylacine
15.	B. Species diversity
16.	Paul Ehrlich used an analogy comparing an ecosystem to an aeroplane and its species to rivets to explain how biodiversity maintains ecosystem stability. • Role of Producers (General Species/Rivets): Every species in an ecosystem acts like a rivet holding the aeroplane together. If individual passengers start popping rivets (causing species extinctions) to take home, it might not immediately threaten flight safety. However, as more and more rivets are removed, the aeroplane (ecosystem) becomes dangerously weak and unstable over time. • Role of Key Species (Key Rivets): Certain critical species act as the rivets on the wings of the aeroplane. The loss of a key species (like a top predator or a critical primary producer) is a major structural threat. Removing a wing rivet causes immediate, catastrophic damage to flight safety, directly causing the collapse of the entire ecosystem's stability.

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