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Biodiversity and Conservation

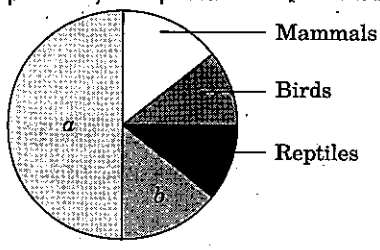
Topic 1 : Biodiversity

Previous Years' Examination Questions

1 Mark Questions

1. *Eichhornia crassipes* is an alien hydrophyte introduced in India. Mention the problem posed by this plant. **[All India 2010C]**

2.



Name the unlabelled areas '*a*' and '*b*' of the pie chart representing biodiversity of vertebrates showing the proportionate number of species of major taxa.

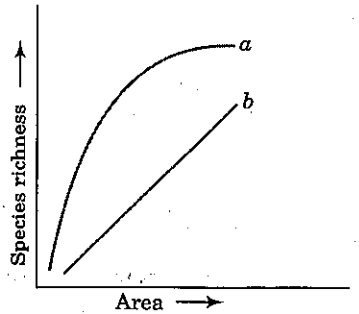
[Foreign 2009]

2 Marks Questions

3. Justify with the help of an example where a deliberate attempt by humans has led to the extinction of a particular species.

[Delhi 2011]

4.



The above graph shows species area relationship. Write the equation of the curve '*a*' and explain. **[All India 2011]**

5. In the biosphere, immense biological diversity exists at all levels of biological organization. Explain any two levels of biodivensity. **[All India 2010]**

6. Giving two reasons explain why there is more species biodiversity in tropical latitudes than in temperate ones.

[All India 2010]

7. List the features that make a stable biological community.

[All India 2010]

8. Alien species are a threat to native species. Justify taking examples of an animal and a plant alien species.

[All India 2010]

9. Write any two hypothesis put forth by ecologists explaining the existence of greater biodiversity in tropical regions than in temperate regions. **[Foreign 2010]**

10. Sometimes alien species affect the indigenous organisms leading to their extinction. Substantiate this statement with the help of any two examples.

[Delhi 2010C]

11. Name the sociobiologist who popularized the term biodiversity. Identify the levels of biodiversity in India represented by.

(a) Diversity among amphibian in Eastern and Western Ghats.

(b) 50000 strains of rice in India.

(c) Presence of deserts, mangroves and coral reefs of India.

[All India 2009]

3 Marks Questions

12. Explain 'rivet popper' hypothesis. Name the ecologist who proposed it.

[Foreign 2011]

13. Why are (a) alien species invasion and (b) loss of habitat and fragmentation considered to be the major cause of loss of biodiversity? Explain with the help of one example each. **[Foreign 2009]**

Explanations

1. When alien species are introduced unintentionally, it turns invasive and cause decline or extinction of indigenous species. It also cause environmental damage by threating the native species.

2. *a*– Fishes
b– Amphibians.

3. Introducton of Nile Perch into Lake Victoria (East Africa) led to the extinction of more than 200 species of cichlid fish from the lake.
(i) Overexploitation of natural resources or overhunting of animals has led to extinction of Steller's sea cow and passenger pigeon.
(ii) Illegal introduction of African cat fish *Clarius gariepinus* for aquaculture purposes is posing a threat to indegenous catfishes.

4. $S = CA^2$
where, S = Species richness
A = Area
C = Y-interecept
(i) Alexander Von Humboldt observed that within a region, species richness increased with increasing explored area, but only up to a limit.
(ii) The relation between species richness and area for a wide variety of taxa like angiosperms, birds, fishes, etc., turns out to be a rectangular hyperbola.

5. Levels of biodiversity in biosphere
(i) **Genetic diversity** It refers to the diversity of genes within a species. For example, there are more than 50000 genetically different strains of rice in India.
(ii) **Species diversity** It refers to the number of different species within a given reason. For example, Western Ghats have a greater amphibian species diversity than Eastern Ghats.

6. Biodiversity is more in tropical latitudes than in temperate ones. The reasons are
(i) Speciation is a function of time. The temperate regions were subjected to frequent glaciation in the past, while the tropics have remained undisturbed and so had longer time to evolve more species diversity.
(ii) More solar radiation is available in tropical region. This leads to more productivity and indirectly to greater species diversity.

7. Features of stable biological community :
(i) It does not show much variation in productivity from year to year.
(ii) It should be resistant or resilient to occasional disturbances both natural and man made.
(iii) It must be resistant to invasions by alien species.

8. Introduction of Nile Perch into Lake Victoria led to the extinction of more than 200 species of cichlid fish in that lake.
(i) Introduction of African cat fish *Clarius gariepinus* for aquaculture poses a threat to the indigenous cat fishes in Indian rivers.
(ii) Carrot grass (*Parthenium*) and *Lantana* introduced into country have become invasive and caused environmental damage. They pose a threat to the native species of plants in our forests.

9. Hypothesis put forth by ecologists
(i) Speciation is a function of time; the temperate regions were subjected to frequent glaciation in the past, while the tropics have remained undisturbed and hence had longer time to evolve more species diversity.
(ii) The tropical environments are less seasonal and relatively more constant and more predictable than temperate regions; speciation has been promoted/favoured by such constant environments and hence there is greater species diversity.
(iii) There is more solar radiation available in the tropical region; this contributes directly to more productivity and indirectly to greater species diversity.

10. Alien species become invasive, compete with the native species and cause extinction of indigenous species.

For example, refer to Ans. 8.

11. Edward Wilson, a sociobiologist popularized the term 'biodiversity'.

(a) **Species diversity** Western Ghats have a greater amphibian species diversity than the Eastern Ghats.

(b) **Genetic diversity** India has more than 50000 genetically different strains of rice.

(c) **Ecological diversity** Presence of deserts, mangroves and coral reefs in India in greater than in scandanavian country like Norway.

12. Rivet popper hypothesis

(i) The hypothesis was proposed by Paul Ehrlich.

(ii) In an airplane (ecosystem), all parts are joined together using thousands of rivets (species).

(iii) If every passenger travelling in it, starts popping a rivet to take home causing a species to become extinct. It may not affect the flight safety (proper functioning of ecosystem) initially, but as more and more rivets are removed, the plane becomes dangerously weak after some time.

(iv) Further, which rivet is removed may also be critical; loss of rivets on the wings.

(v) Key species (that derive major ecosystem function) is obviously a more serious threat to flight safety than loss of a few rivets on the seats or windows inside the plane.

13. (a) The alien species become invasive and cause extinction or decline of indigenous species, e.g., the Nile Perch introduced into Lake Victoria in East Africa led to the extinction of more than 200 species of cichlid fish in the lake.

(b) Loss of habitat and fragmentation drive animals and plants to extinction. For example, as the Amazon forest is cut and cleared for cultivating soyabeans or for conversion of grasslands for raising beef cattle, many species are affected.

Topic 2 : Biodiversity Conservation

Previous Years'
Examination Questions

1 Mark Questions

1. Write the importance of cryopreservation in conservation of biodiversity. **[Delhi 2011]**
2. India has more than 50000 strains of rice. Mention the level of biodiversity it represents. **[All India 2010]**
3. Mention one application of pollen bank. Haw are pollen stored in a bank? **[Delhi 2008C]**

2 Marks Questions

4. State the use of biodiversity in modern agricultrue. **[All India 2011]**
5. Biodiversity must be conserved as it plays an important role in many ecosystem services that nature provides. Explain any two services of the ecosystem. **[Delhi 2010]**
6. Why certain region have been declared as biodiversity hot spots by environmentalists of the world? Name any two hot spot region of India. **[Delhi 2010]**

3 Marks Questions

7. White Bengal tigers are protected in special settings in zoological parks. Tiger reserves are maintained in Western Ghats.
   (a) How do these two approaches differ from each other. Mention the advantages of each one?
   (b) What is the significance of cryopreservation technique?
   [All India 2010C]

Explanations

1. Cryopreservation is a technique in which gametes of threatened species can be preserved in viable and fertile conditions.
2. Genetic diversity.
3. Pollen grains can be used as pollen banks like seed banks. Stored pollen grains can be used in pollen breeding programmes. Pollen grains can be stored in liquid nitrogen –196°C for years.
4. Biodiversity uses in modern agriculture
   (i) Humans obtain food, fibres, medicines and many industrial products from plants.
   (ii) Wild relatives of our plants are used for breeding to obtain disease resistant pest resistant and with many desirable traits in crop plants.
   (iii) Exploring molecular, genetic and species level diversity for economically important products rich biodiversity can be obtained.
5. The two ecosystem services are
   (i) Forest ecosystem purity air, mitigate droughts and floods.
   (ii) The cycling nutrients generate fertile soil and maintain biodiversity.
6. Certain regions are declared hot spots by the environmentalists because these regions have high levels of species richness and high degree of endemism.
   Hot spots of India, such as Western Ghats and Sri Lanka and Himalayas are two examples.
7. White Bengal tigers are protected in special settings in zoological parks. This is called ex *situ* conservation.
   (a) Tiger reserves are maintained in Western Ghats. This is called *in situ* conservation.
   (b) Differences between *in situ* conservation and ex *situ* conservation.

***In situ* Conservation**	***Ex situ* Conservation**
It is the conservation and protection of biodiversity in natural habitat.	It is the conservation of selected threaetened plant and animal species in places outside their natural habitat.
Population is conserved in surroundings, where they have developed their distinctive features.	Population is conserved under simulated conditions that closely resemble their natural habitats.
Examples– National parks, biosphere reserves, wild life sanctuaries, etc.	Examples– Botanical gardens, zoological parks wild life safari, gene bank, etc.