CBSE Class 12 Biology
NCERT Exemplar Solutions
CHAPTER 15
BIODIVERSITY AND CONSERVATION

Multiple Choice Questions (MCQs)

1. Which of the following countries has the highest biodiversity

(a) Brazil

(b) South Africa

(c) Russia

(d) India

Ans. (a) Brazil

Explanation: This country falls in the area of Amazon rainforest which is having the highest biodiversity in the world.

2. Which of the following is not a cause for loss of biodiversity?

(a) Destruction of habitat

(b) Invasion by alien species

(c) Keeping animals in zoological parks

(d) Over-exploitation of natural resources

Ans. (c) Keeping animals in zoological parks

Explanation: Keeping animals in zoological parks helps in conservation of biodiversity. It gives a natural and safe environment with a supervision to check their decresing numbers.

3. Which of the following is not an invasive alien species in the Indian context?

(a) Lantana

(b) Cynodon

(c) Parthenium

(d) Eichhornia

Ans. (b) Cynodon

Explanation: Other species from the options were introduced into India from some other parts of the world. Cynodon is yet not introduced or spotted in india.

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4. Where among the following will you find pitcher plant?

(a) Rainforest of North-East India

(b) Sunderbans

(c) Thar Desert

(d) Western Ghats

Ans. (a) Rainforest of North-East India

Explanation: in rainforest of North-East India pitcher plants are spotted because moist and humid climate is favourable to them.

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5. Which one of the following is not a feature of biodiversity hot spots?

(a) Large number of species

(b) Abundance of endemic species

(c) Mostly located in the polar regions

(d) Mostly located in the tropics

Ans. (c) Mostly located in the polar regions

Explanation: Polar regions have poorest biodiversity because of low sunlight, very low temperature and negligible precipitation.

6. Match the animals given in column A with their location in column B:

Column A	Column B
(i) Dodo	(a) Africa
(ii) Quagga	(b) Russia
(iii) Thylacine	(c) Mauritius
(iv) Stellar's sea cow	(d) Australia

Choose the correct match from the following:

(a) (i)-(a), (ii)-(c), (iii)-(b), (iv)-(d)

(b) (i)-(d), (ii)-(c), (iii)-(a), (iv)-(b)

(c) (i)-(c), (ii)-(a), (iii)-(b), (iv)-(d)

(d) (i)-(c), (ii)-(a), (iii)-(d), (iv)-(b)

Ans. (d) (i)-(c), (ii)-(a), (iii)-(d), (iv)-(b)

Explanation: (d) (i)-(c), (ii)-(a), (iii)-(d), (iv)-(b)

7. What is common to the following plants: Nepenthes, Psilotum, Rauwolfia and Aconitum?

(a) All are ornamental plants

(b) All are phylogenic link species

(c) All are prone to over exploitation

(d) All are exclusively present in the Eastern Himalayas.

Ans. (c) All are prone to over exploitation

Explanation: These plants have various medicinal uses in traditional medicines and hence they are exploited and prone to increased exploitation.

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8. The one-horned rhinoceros is specific to which of the following sanctuary

(a) Bhitar Kanika

(b) Bandipur

(c) Kaziranga

(d) Corbett park

Ans. (c) Kaziranga

Explanation: Kaziranga national park provides shelter to one horned rhinoceros.

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9. Amongst the animal groups given below, which one has the highest percentage of endangered species?

(a) Insects

(b) Mammals

(c) Amphibians

(d) Reptiles

Ans. (c) Amphibians

Explanation: At present, 33% of all amphibian species face threat of extinction.

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10. Which one of the following is an endangered plant species of India?

(a) Rauwolfia serpentina

(b) Santalum album (Sandal wood)

(c) Cycas beddonei

(d) All of these

Ans. (d) All of these

Explanation: (d) All of these

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11. What is common to Lantana, Eichhornia and African catfish?

(a) All are endangered species of India.

(b) All are key stone species.

(c) All are mammals found in India.

(d) All the species are neither threatened nor indigenous species of India.

Ans. (d) All the species are neither threatened nor indigenous species of India.

Explanation: All the species are neither threatened nor indigenous species of India.

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12. The extinction of passenger pigeon was due to:

(a) Increased number of predatory birds.

(b) Over exploitation by humans.

(c) Non-availability of the food.

(d) Bird flu virus infection.

Ans. (b) Over exploitation by humans.

Explanation: Passenger pigeons were native birds to North America. They become extinct due to excessive hunting.

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13. Which of the following statements is correct?

(a) Parthenium is an endemic species of our country.

(b) African catfish is not a threat to indigenous catfishes.

(c) Steller's sea cow is an extinct animal.

(d) Lantana is popularly known as carrot grass.

Ans. (c) Steller's sea cow is an extinct animal.

Explanation: (c) Steller's sea cow is an extinct animal.

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14. Among the ecosystem mentioned below, where can one find maximum biodiversity?

(a) Mangroves

(b) Desert

(c) Coral reefs

(d) Alpine meadows

Ans. (c) Coral reefs

Explanation: Mangroves and alpine meadows can support only a select number of species. Some condition is in deserts as well.

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15. Which of the following forests is known as the 'lungs of the planet Earth'?

(a) Tiaga forest

(b) Tundra forest

(c) Amazon rain forest

(d) Rain forests of North East India

Ans. (c) Amazon rain forest

Explanation: (c) Amazon rain forest

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16. The active chemical drug reserpine is obtained from:

(a) Datura

(b) Rauwolfia

(c) Atropa

(d) Papaver

Ans. (b) Rauwolfia

Explanation: Rauwolfia extract is used in developing the drug serpentine.

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17. Which of the following group exhibit more species diversity?

(a) Angiosperms

(b) Algae

(c) Bryophytes

(d) Fungi

Ans. (d) Fungi

Explanation: Among plants; angiosperms and fungi show largest number of species.

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18. Which of the below mentioned regions exhibit less seasonal variations?

(a) Tropics

(b) Temperates

(c) Alpines

(d) Both (a) & (b)

Ans. (a) Tropics

Explanation: Tropics get the same amount of illumination throughout the year and hence there is less seasonal variation.

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19. The historic convention on Biological Diversity held in Rio de Janeiro in 1992 is known as:

(a) CITES Convention

(b) The Earth Summit

(c) G-16 Summit

(d) MAB Programme

Ans. (b) The Earth Summit

Explanation: (b) The Earth Summit

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20. What is common to the techniques (i) in vitro fertilisation, (ii) Cryo preservation and (iii) tissue culture?

(a) All are in situ conservation methods.

(b) All are ex situ conservation methods.

(c) All require ultra-modern equipment and large space.

(d) All are methods of conservation of extinct organisms.

Ans. (b) All are ex situ conservation methods.

Explanation: Option (a) can be easily ruled out. Tissue culture does not require large space and hence option (c) can be ruled out. Extinct organisms cannot be conserved, so option (d) can be rule out.

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NCERT Exemplar Solutions
CHAPTER 15
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Very Short Answer Type Questions

1. What characteristics make a community stable?

Ans. Following characteristics make a community stable:

(a) Least variation in productivity from year to year

(b) Resistance to occasional disturbances

(c) Resistance to invasion by alien species

2. What could have triggered mass extinctions of species in the past?

Ans. Following are the reasons of mass extinctions of species in the past:

(a) Natural disturbances

(b) Alien invasion

3. What accounts for the greater ecological diversity of India?

Ans. Following are the reasons for greater ecological diversity of India:

(a) Low Latitude: Biodiversity is higher in lower latitudes than in higher latitudes

(b) Presence of rainforests and deciduous forests

(c) Presence of mountain forests

4. According to David Tilman, greater the diversity, greater is the primary productivity. Can you think of a very low diversity man-made ecosystem that has high productivity?

Ans. Crop field has high productivity but a low diversity. Crop field is a man-made ecosystem.

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5. What does 'Red' indicate in the IUCN Red list (2004)?

Ans. It indicates extinct species.

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6. Explain as to how protection of biodiversity hot spots alone can reduce up to 30% of the current rate of species extinction.

Ans. The number of species which live in biodiversity hotspots is extremely high. Hence, protection of biodiversity hotspots alone can reduce up to 30% the current rate of species extinction.

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7. What is the difference between endemic and exotic species?

Ans. A species which is confined to a particular geographical area is called endemic to that area. On the other hand, a species which has been introduced into a geographical area from some other area is called exotic species.

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8. How does species diversity differ from ecological diversity?

Ans.

Ecological Diversity	Species Diversity
(i) It shows the diversity in terms of type ecosystem in a geographical area.	(i) It shows diversity in terms of species under a particular genus.
(ii) Presence of rainforest, desert, deciduous forests, etc. in India is an example of ecological diversity.	(ii) Presence of many species of frogs an example of species diversity.

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9. Why is genetic variation important in the plant Rauwolfia vomitoria?

Ans. There plants produce various chemicals with medicinals properties. This could be possible because of genetic variation in Rauwolfia. Moreover, genetic variation also indicates towards richer biodiversity.

10. What is Red Data Book?

Ans. The IUGN releases Red List to show the number of extinct and endangered species. Different countries also release their own version of this list; which is usually termed as Red Data Book.

11. Define gene pool

Ans. The set of all gene in a population of a particular species is called gene pool of that species.

12. What does the term 'Frugivorous' mean?

Ans. A fruit-eating animal is called 'Frugivorous' e.g. monkeys.

13. What is the expanded form of IUCN?

Ans. International Union for the Conservation of Nature.

14. Define the terms (i) Bioprospecting (ii) Endemism

Ans. (i) **Bioprospecting:** The process of discovery and commercialization of new products; based on biological resources; is called bioprospecting.

(ii) **Endemism:** Certain geographical regions have high prevalence of endemic species. This phenomenon its called endemism.

15. What is common to the species shown in figures A and B?

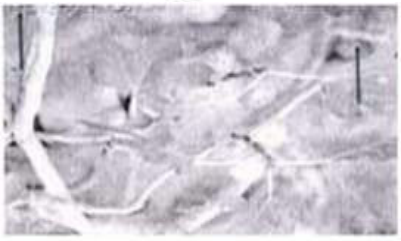
A

B

Ans. Both are invasive weed species

16. What is common to the species shown in figures A and B?

A



B

Ans. Both are examples of Keystone species. A species which has a very high impact on its environment and the impact is disproportionate to its numerical strength; is called a keystone species.

CBSE Class 12 Biology
NCERT Exemplar Solutions
CHAPTER 15
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Short Answer Type Questions

1. How is the presently occurring species extinction different from the earlier mass extinctions?

Ans. Earlier mass extinctions were caused by natural disturbances. But current mass extinction is happening because of man-made interventions. Loss of habitat for a large number of organisms is because of human interventions.

2. Of the four major causes for the loss of biodiversity (Alien species invasion, habitat loss and fragmentation, over-exploitation and co-extinctions which according to you is the major cause for the loss of biodiversity? Give reasons in support.

Ans. In my view, habitat loss and fragmentation is the major cause for the loss of biodiversity. Loss of habitat is mainly brought about by humans; through deforestation and pollution. More than 50% of the Amazon rainforest has been cleared by humans. Since Amazon rainforest is richest in biodiversity; reduce forest cover in this region has led to a great loss of biodiversity. This speaks about the huge impact which habitat loss and fragmentation can have on biodiversity.

3. Discuss one example, based on your day-to-day observations, showing how loss of one species may lead to the extinction of another.

Ans. Let us take the example of an insect. Let us assume that it plays important role in pollination of many plants. If the insect becomes extinct, that will mean a problem for those plants which depend on this insect for pollination. Those plants will not be able to produce seeds and may become extinct in due course of time. After the extinction of those plants; any species which depend on them for food will be left with limited resources for food. This shows that extinction of even a single species can prove disastrous for the whole ecosystem.

4. A species-area curve is drawn by plotting the number of species against the area. How is it that when a very large area is considered the slope is steeper than that for smaller areas?

Ans. When we consider a large area to assess species-area curve, we need to understand advantages offered by large area. A larger area means more resources and a higher number of plants. This will provide more food to sustain more individuals. Thus, it will result in a greater number of species than what is possible in a confined area. This explains the occurrence of steeper slope when we draw species-area curve for a large area.

5. Is it possible that productivity and diversity of a natural community remain constant over a time period of, say one hundred years?

Ans. A community in which productivity and diversity is constant is called a climax community. It takes millions of years for a community to progress form primary stage to climax stage. A period of one hundred years is just a small blip in the timeline of community succession. Hence, in most of the cases, a community can easily maintain constancy of productivity and diversity over a time period of hundred years.

6. There is greater biodiversity in tropical /subtropical regions than in temperate region. Explain.

Ans. Following are the reasons for greater biodiversity in tropical/subtropical regions:

(a) Tropical regions have remained undisturbed during the course of evolution on earth. But temperate regions had been subject to frequent glaciations in the past. This provided ample scope for evolution for the organisms in the tropical regions. This could have led to a greater biodiversity in the tropical region.
(b) Tropical environment remains more or less constant throughout the year.
(c) More solar energy is available in tropical regions. This helps in higher productivity in this region which sustains a diverse set of organisms.

7. Why are the conventional methods not suitable for the assessment of biodiversity of bacteria?

Ans. Conventional methods are not sufficient to identify many prokaryotic species. Scientists are yet to discover many species of bacteria which are living on this earth. Without complete knowledge of all the species present, it is not possible to properly assess the biodiversity of bacteria.

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8. What criteria should one use in categorizing a species as threatened?

Ans. Critical depensation is one of the population dynamics. It is a mathematical model and is used to categorize a species as threatened. When the population of a species reaches to such a low level that it is unable to sustain itself; this level is called critical depensation. Once the population reaches at this level, it faces the threat of extinction.

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9. What could be the possible explanation for greater vulnerability of amphibians to extinction as compared to other animal groups?

Ans. Scientist have yet to understand the proper cause for large scale extinction of amphibians. Some of the possible reasons are: disease, habitat destruction and modification, exploitation, pollution, pesticide use, exotic species and ultraviolet-B radiation. Their complex reproductive need may be one of the cause of high vulnerability of amphibians to extinction.

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10. How do scientists extrapolate the total number of species on Earth?

Ans. Following steps are taken to estimate the total number of species on Earth:

(a) An exhaustively studied group of insects is selected.
(b) Its number of species in tropics is compared with that in subtropics.
(c) This ratio is extrapolated to estimate the number of other species.
(d) Finally, total estimate about the number of species on Earth is made.

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11. Humans benefit from diversity of life. Give two examples.

Ans. Following are the two benefits which human beings derive from biodiversity:

(a) We get food, medicines, raw materials, wood, etc. from nature and this is possible become

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of biodiversity.
(b) Biodiversity helps in maintaining the ecosystem. A healthy ecosystem is beneficial for all of us.

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12. List any two major causes other than anthropogenic causes of the loss of biodiversity.

Ans. Two major causes (other than anthropogenic causes) for the loss of biodiversity are as follows:

(a) **Glaciations and Global warming:** The earth had been through many phase of glaciations and global warming. Mammoths are believed to have existed during the Ice Age. Global warming led to end of the Ice Age which resulted in mass extinction.

(b) **Meteor hit:** Dinosaurs are believed to become extinct because of meteor hit.

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13. What is an endangered species? Give an example of an endangered plant and animal species each?

Ans. A species which has been categorized by IUCN Red list as likely to become extinct is called an endangered species.

- Platanthera praeclara (a type of orchid) is an endangered plant.
- Panthera pardus orientalis (a type of leopard) is an endangered animal.

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14. What are sacred groves and their role in biodiversity conservation?

Ans. In many tribal areas, a part of the forest is set aside. All the plants and animals in this part are worshipped and no harm is done to them. This part is called sacred grove.

Sacred grove help in creating awareness about biodiversity conservation. This consciousness has been passed down through generations to tribal people. This has definitely helped the tribal in conservation of flora and fauna around their dwelling.

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15. Suggest a place where one can go to study coral reefs, mangrove vegetation and

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estuaries.

Ans. For studying coral reefs, one should go to the coast along Tamil Nadu. For mangrove vegetation, one should go to the southern tip of West Bengal. For estuaries, one should go and travel through the backwaters of Kerala.

16. Is it true that there is more solar energy available in the tropics? Explain briefly.

Ans. It is absolutely true that more solar energy is available in the tropics. Sunlight falls directly at the tropics. Because of straight illumination, the duration of day is longer at the tropics than at higher latitudes. Due to this, plenty of sunlight is available in the tropics. Better availability of solar energy results in higher productivity which is evident from the rich biodiversity in this region.

17. What is co-extinction? Explain with a suitable example?

Ans. When a species becomes extinct, then plants and animals which were obliquely dependent on it also become extinct in due course of time. This phenomenon is called co-extinction. If a fish becomes extinct, then many parasites which got sustenance from the fish become extinct. Many predators for which this fish was the main source of food would also become extinct.

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NCERT Exemplar Solutions
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Long Answer Type Questions

1. Elaborate how invasion by an alien species reduces the species diversity of an area.

Ans. When an alien species is deliberately or accidentally introduced into an area, it may become invasive and threaten other species. Invasive species can be a serious competitor; competing for the same resources. It can also turn out to be predator for some species. There are many examples of invasive species which played havoc with the local biodiversity. Some examples are as follows:

(a) **Water Hyacinth:** Water Hyacinth is originally from amazon basin. It has proved to be invasive species in many countries. This plant grows at rapid rate and covers the whole pond and lake. By covering the surface of the pond, this plant reduces the supply of sunlight and oxygen to the bottom of the pond. Thus, it proves detrimental for other organisms in the pond.

(b) **Parthenium or Carrot Grass**: This plant came as contaminant along with imported wheat from America. This plant proved to be highly invasive in India. This is a notorious breed which becomes a big problem for the farmers in India.

2. How can you, as an individual, prevent the loss of biodiversity?

Ans. We have studied that human interventions have hastened the loss of biodiversity and loss of habitat is a major cause for this. If we can work towards reducing the loss of habitat, then it will help in preventing the loss of biodiversity. Following steps can be taken to achieve this:

(i) **Reduce:** I will reduce my consumption of various items. Reduction in demand will help in reducing the demand for natural resources. This will help in reducing deforestation and thus will help in preventing the loss of biodiversity.

(ii) **Reuse:** I will reuse old items whenever possible. Old containers can be used for keeping household items. Reuse also helps in reducing the drain of natural resources.

(iii) **Recycle:** I will recycle various items. For example; old newspaper can be used for making papier mache items. Old and discarded clothes can be used for making shopping bags and curtains.

Apart from reducing the drain on natural resources; three Rs also help in minimizing pollution. If pollution can be checked, it will surely help in protecting the biodiversity.

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3. Can you think of a scientific explanation, besides analogy used by Paul Ehrlich, for the direct relationship between diversity and stability of an ecosystem?

Ans. An ecosystem works on continuous interaction and interdependencies among various components. All the living beings depend on various abiotic factors to obtain raw material and energy. Producers depend on soil, air and sunlight to produce food. Primary consumers depend on producers for food. Secondary consumers depend on primary consumers for food. Now let us consider following scenario.

Imagine two herbivores A and B. Animal A can feed on a variety of plants, while animal B can feed on only one plant. If the sole plant which is eaten by animal B is somehow wiped out from the area, then animal B will also face extinction. But loss of a few plant species will not pose any danger to the existence of animal A. This shows the advantage of diversity in terms of available plants for animal A.

The above logic applies to other organisms as well. This means that if there is rich biodiversity in the ecosystem, then primary and secondary productivity is at optimum level. This helps in maintaining stability in the ecosystem.

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4. Though the conflict between humans and wildlife started with the evolution of man, the intensity of conflict has increased due to the activities of modern man. Justify your answer with suitable examples.

Ans. Modern man is capable of doing many activities which were not possible by earlier species of hominid. Following examples illustrate this:

(a) Modern man began agriculture. Land was cleared to make way for farming. This changed the climate in dramatic way. Farming also increased the level of conflict between humans and wildlife.

(b) Modern man began industries. Many natural resources begun to be exploited to promote industrialization. This not only resulted in exploitation of forests and wildlife but also created pollution. All of this disturbed the wildlife.

(c) Railways revolutionized the way we travel. But trains are big cause for loss of habitat and life for many wild animals.

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5. What is an ecosystem service? List any four important ecosystem services provided by the natural ecosystems. Are you in favour or against levying a charge on the service provided by the ecosystem?

Ans. The product of ecosystem processes are called ecosystem service.

Following is the list of four important ecosystem service:

(a) Purification of air and water
(b) Rainfall
(c) Pollination of crops
(d) Assimilation of excess carbon

There should be no charge for ecosystem services because nature provides everything for free. However, there should be proper attempts to estimate the cost of these services. Data about costs of these services should be made available to the general public. Every person should be educated about the real value of ecosystem services. This will help us in appreciating the real value of services which we get from the ecosystem.

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6. Describe the consumptive use value of biodiversity as food, drugs and medicines, fuel and fiber with suitable examples.

Ans. Consumptive Use Value: Many natural products are consumed at local level by human beings. But we neither sell nor buy these products. These products do not make direct contribution to the nation's economy. The value of these products is called consumptive use

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value of biodiversity.

(a) We pay for almost all the food we consume but we do not pay for the soil, water and air which play important role in food production.

(b) Many naturally occurred herbs are used for their medicinal use by indigenous people. In most of the cases, people do not need to pay for using such plants. This also shows consumptive use value.

(c) Firewood is used by about 2.4 million people all over the world for cooking and heating. People who use firewood do not need to pay for that. Had they been using some other fuel they would have paid some money for that. This shows consumptive use value of firewood.

(d) In rural area, people often use naturally growing fibre plants for making ropes and other useful items. They don't pay for the fibre. This shows consumptive use value of fibre.

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7. Species diversity decreases as we move away from the equator towards the poles. What could be the possible reasons?

Ans. Following are the reasons for greater species diversity near equator than at the poles.

Equator receives direct illumination and hence has experienced more or less uniform climatic conditions throughout the history of evolution. Stable conditions near equator has given rise to large number of species. When we consider about the temperate regions; the climatic conditions have changed dramatically in these regions. Many species which lived in these regions become extinct during dramatic climatic changes. Hence, we find a lower number of species in these regions. In polar regions due to extreme cold climatic condition and less availability of sunlight species diversity is very less.

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8. Explain briefly the 'rivet popper hypothesis' of Paul Ehrlich.

Ans. Paul Ehrlich gave the 'rivet' (species) popper hypothesis' which can be explained as follows:

(a) An aeroplane has thousands of rivets which are important for joining different parts of the plane.

(b) Some rivets are more important (key species) than others because they may be present on a part which is structurally crucial (has major ecosystem function) for aeroplane.
(c) If a person takes out a rivet from a seat to keep it as a memento (causing a species to extinct); nothing is going to happen to the aeroplane. Even if all the rivets from a seat are taken out by subsequent passengers, the only damage will be the collapse of that particular seat.
(d) If a person takes out a rivet from the wing of the aircraft (key species), there can be some issue of stability during flight. If all the rivets form the wing are taken out, then the flight will end in a disastrous crash.

This analogy shows that if an organism is highly crucial for an ecosystem, then its extinction can spell doom for the ecosystem.

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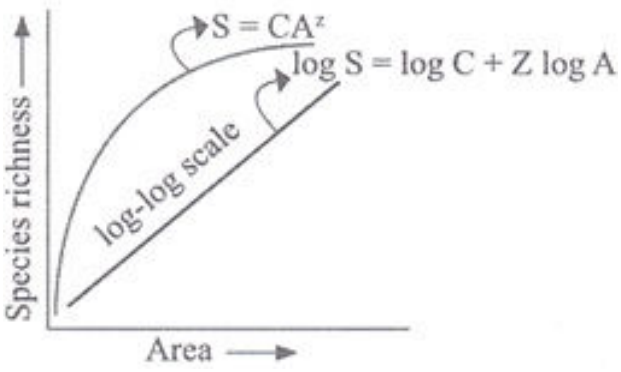
9. The relation between species richness and area for a wide variety of taxa turns out to be a rectangular hyperbola. Give a brief explanation.

Ans. Species richness in any area depends on various factors. Some of them are as follows:

(a) Balance between immigration and extinction
(b) Rate and magnitude of disturbance in small area Vs large area
(c) Predator prey dynamics
(d) Clustering of individuals of the same species because of dispersal limitations.



When the area increases up to a certain extent, number of species increases; as shown by the graph. This can happen because of reduced rate of disturbance and because of favourable predator prey dynamics. Once the area increase beyond the threshold level, there is no growth in number of species. This can happen because of dispersal limitations.
