UNIT V

Chapter 11

BIODIVERSITY AND ITS CONSERVATION

CHAPTER SNAPSHOT

MUST KNOW DEFINITIONS

Biodiversity	:	Biodiversity is the assemblage of different life forms.
Species diversity	:	Species diversity refers to the variety in number and richness of the species in any habitat.
Exotic species	:	Non-native or alien species.
Co-extinction	:	Coextinction of a species is the loss of a species as a consequence of the extinction of another. (**Eg.** Orchid bees and forest trees by cross pollination.)
Hot spots	:	They are areas with high concentration of endemic species experiencing unusual rapid rate of habitat modification loss.
Extinction	:	Species is considered extinct when none of its members are alive anywhere in the world.
Red Data Book	:	Red Data book or Red list is a catalogue of taxa facing risk of extinction.
IUCN	:	International Union of Conservation of Nature
WPA	:	Wildlife Protection Act
WLS	:	Wild Life Sanctuary
BR	:	Biosphere Reserve
MAB	:	Man and Biosphere Programme
WWF	:	World Wild Fund for Nature
CITES	:	The Convention on International Trade in Endangered Species
ZSI	:	Zoological Survey of India
FREEP	:	The Forestry Research Education and Extension project
CBD	:	The United Nations Convention on Biological Diversity
NBA	:	National Biodiversity Authority

Evaluation

1. Which of the following region has maximum biodiversity?

(a) Taiga (b) Tropical forest
(c) Temperate rain forest (d) Mangroves

[*Ans.* (b) Tropical forest]

2. Conservation of biodiversity within their natural habitat is.

(a) *Insitu* conservation
(b) *Exsitu* conservation
(c) In vivo conservation
(d) In vitro conservation

[*Ans.* (a) *Insitu* conservation]

3. Which one of the following is not coming under insitu conservation?

(a) Sanctuaries
(b) Natural parks
(c) Zoological park
(d) Biosphere reserve

[*Ans.* (c) Zoological park]

4. Which of the following is considered a hotspots of biodiversity in India?

(a) Western ghats
(b) Indo-gangetic plain
(c) Eastern Himalayas
(d) A and C

[*Ans.* (d) A and C]

5. **The organization which published the red list of species is**

(a) WWF (b) IUCN
(c) ZSI (d) UNEP

[*Ans.* (b) IUCN]

6. **Who introduced the term biodiversity?**

(a) Edward Wilson (b) Walter Rosen
(c) Norman Myers (d) Alice Norman

[*Ans.* (b) Walter Rosen]

7. **Which of the following forests is known as the lungs of the planet earth?**

(a) Tundra forest
(b) Rain forest of north east India
(c) Taiga forests
(d) Amazon rain forest

[*Ans.* (d) Amazon rain forest]

8. **Which one of the following are at high risk extinction due to habitat destruction?**

(a) Mammals (b) Birds
(c) Amphibians (d) Echinoderms

[*Ans.* (c) Amphibians]

9. **Assertion (A):** The Environmental condition of the tropics are favourable for speciation and diversity of organisms.

Reason (R): The climate seasons, temperature, humidity and photoperiod are more or less stable and congenial.

[*Ans.* (a) Both Assertion and Reason are true and Reason explains Assertion correctly]

10. **Define endemism.**

Ans. Endemism refers to presence of some species in particular regions only and nowhere else.

11. **How many hotspots are there in India? Name them.**

Ans. India is home to four biodiversity hotspots (as per ENVIS). They are

(a) Himalaya (The entire Indian Himalayan region)

(b) Western Ghats

(c) **Indo-Burma:** Includes entire North-eastern India, except Assam and Andaman group of Islands (And Myanmar, Thailand, Vietnam, Laos, Cambodia and Southern China)

(d) **Sundalands:** Includes Nicobar group of Islands (and Indonesia, Malaysia, Singapore, Brunei, Philippines).

12. **What are the three levels of biodiversity?**

Ans. There are three levels of biodiversity – (1) Genetic diversity (2) Species diversity and (3) Community/Ecosystem diversity.

(1) Genetic diversity :

(i) Refers to the differences in genetic make-up (number and types of genes) between distinct species and to the genetic variation within a single species; also covers genetic variation between distinct populations of the same species.

(ii) Genetic diversity can be measured using a variety of molecular techniques. India has more than 50,000 genetic variants of paddy and 1000 variants of mango.

(iii) Variation of genes of a species increases with diversity in size and habitat. It results in the formation of different races, varieties and subspecies.

(iv) *Rouwolfia vomitaria*, a medicinal plant growing in different ranges of the Himalayas shows differences in the potency and concentration of the active ingredient reserpine due to genetic diversity.

(v) Genetic diversity helps in developing adaptations to changing environmental conditions.

(2) Species diversity :

(i) It refers to the variety in number and richness of the species in any habitat. The number of species per unit area at a specific time is called species richness, which denotes the measure of species diversity.

(ii) The Western Ghats have greater amphibian species diversity than the Eastern Ghats. The more the number of species in an area the more is the species richness. The three indices of diversity are - **Alpha**, **Beta** and **Gamma diversity**

(a) **Alpha diversity:** It is measured by counting the number of taxa (usually species) within a particular area, community or ecosystem.

(b) **Beta diversity:** It is species diversity between two adjacent ecosystems and is obtaining by comparing the number of species unique to each of the ecosystem.

(c) Gamma diversity refers to the diversity of the habitats over the total landscape or geographical area.

(3) Community/Ecosystem diversity : The variety of habitats, biotic communities, and ecological processes in the biosphere. It is the diversity at ecosystem level due to diversity of niches, trophic levels and ecological processes like nutrient cycles, food webs, energy flow and several biotic interactions.

13. Name the active chemical found in the medicinal plant *Rauwolfia vomitoria*. What type of diversity it belongs to?

Ans. *(i)* *Rouwolfia vomitaria*, a medicinal plant growing in different ranges of the Himalayas shows differences in the potency and concentration of the active ingredient reserpine due to genetic diversity.

(ii) Genetic diversity helps in developing adaptations to changing environmental conditions.

14. "Amazon forest is considered to be the lungs of the planet"-Justify this statement.

Ans. The most important pattern of biodiversity in latitudinal gradient in diversity. Diversity is said to be maximum at the tropics because of the following reasons.

(i) Warm tropical regions on either side of the equator posses congenial habitats for living organisms.

(ii) Environmental conditions of the tropics are favorable for speciation and also support variety and number of organisms.

(iii) The temperature range from 25°c to 35°c is ideal for metabolic activities of living organism.

(iv) Average rainfall is more than 200 mm/ year.

(v) Climate, seasons, temperature, humidity, photoperiod are more or less stable and encourage number of variety of species.

(vi) Rich resource and nutrient availability is an added advantage.

Tropical rain forests occupied about 14% of earth's land surface earlier which is reducing now. The Amazon Rain forest is a classical example of a Tropical Rain forest and is a vast area harbouring millions of species. It is the largest Tropical forest in the world with all the features as listed above. Thus it is aptly called as "Lungs of the Planet" . It is being destroyed now and replaced for agriculture and Human settlement.

15. "Red data book"-What do you know about it?

Ans. *(i)* Red Data book or Red list is a catalogue of taxa facing risk of extinction.

(ii) IUCN – International Union of Conservation of Nature and Natural Resources

(iii) WCU – World Conservation Union maintains the Red Data book.

The purpose of preparation of Red List are:

(i) To create awareness on the degree of threat to biodiversity

(ii) Identification and documentation of species at high risk of extinction

(iii) Provide global index on declining biodiversity

(iv) Preparing conservation priorities and help in conservation of action

(v) Information on international agreements on conservation of biological diversity

Red list has eight categories of species:

(i) Extinct
(ii) Extinct in wild
(iii) Critically Endangered
(iv) Endangered
(v) Vulnerable
(vi) Lower risk
(vii) Data deficiency
(viii) Not evaluated.

16. Extinction of a keystone species led to loss of biodiversity – Justify.

Ans. *(i)* Keystone species are those which have an extremely high impact on a particular ecosystem relative to its population. They are critical for the overall structure and function of an ecosystem and influence other and plants and animals that make up that ecosystem. Thus in the absence of a keystone species, many ecosystems will fail to exist.

(ii) Predator-prey relationship is an important example. Small Predators that consume herbivorous species prevent such herbivores from destroying the plant species in the ecosystem and are thus considered as keystone species.

(iii) If the number of predators were to decrease, the herbivore population would increase and the plant species in the ecosystem may perish very fast. In turn the other organisms dependent on plants may also be impacted.

(iv) Thus extinction of a keystone species will lead to loss of biodiversity. **Eg.** Sea otter is considered to be a keystone species in the near shore ecosystem. The Kelp forests are a critical habitat for many organisms in near shore ecosystems. These are fed by sea urchins. The Otters feed an Sea Urchins. In the absence of Otters, the sea urchins will destroy the Kelps forest which in turn will impact several other organisms and lead to loss of biodiverity in the ecosystem.

17. Compare and Contrast the insitu and exsitu conservation.

Ans. Insitu and Exsitu are two types of biodiversity conservation strategies.

S.No	*Insitu* Conservation	*Exsitu* Conservation
i.	It is the on-site conservation or the conservation of genetic resources in natural populations of plant or animal species.	This is a conservation strategy which involves placing of threatened animals and plants in special care locations for their protection.
ii.	It is the process of protecting an endangered plant or animal species in its natural habitat, either by protecting or restoring the habitat itself, or by defending the species from predators.	It helps in recovering populations or preventing their extinction under simulated conditions that closely resemble their natural habitats.
iii.	National Parks, Biosphere Reserve, Wild Life Sanctuaries form *insitu* conservation strategies.	Zoological parks and Botanical gardens are common *exsitu* conservation programs.

18. What are called endangered species? Explain with examples.

Ans. *(i)* A species that has been categorized as very likely to become extinct is an endangered species. Endangered (EN), as categorized by the International Union for Conservation of Nature (IUCN) Red List, is the second most severe conservation status for wild populations in the IUCN's scheme after Critically Endangered (CR).

(ii) In 2012, the list features 3079 animal and 2655 plant species as endangered (EN) worldwide. **Eg.** Tiger and Sea Turtles have been classified by the IUCN as critically endangered species in 2018. Nilgiri tahr is an endangered species in the IUCN Red List of Threatened Species due to hunting and poaching

19. Why do we find a decrease in biodiversity distribution, if we move from the tropics towards the poles?

Ans. *(i)* Temperature, precipitation, distance from the equator (latitudinal gradient), altitude from sea level (altitudinal gradient) are some of the factors that determine biodiversity distribution patterns.

(ii) The most important pattern of biodiversity is latitudinal gradient in diversity. This means that there is an increasing diversity from the poles to equator.

(iii) Diversity increases as one moves towards the temperate zones and reaches the maximum at the tropics. Thus, tropics harbour more biodiversity than temperate or polar regions, especially between the latitudes of 23.5^{0}N and 23.5^{0}S. Harsh conditions exist in temperate areas during the cold seasons while very harsh conditions prevail for most of the year in polar regions.

20. What are the factors that drive habitat loss?

Ans. *(i)* Development of human society is inevitable. Natural habitats are destroyed for the purpose of settlement, agriculture, mining, industries and construction of highways. Species are forced to adapt to the changes in the environment or move to other places. If not, they become victim to predation, starvation, disease and eventually die or results in human animal conflict.

(ii) Over population, urbanization, industrialization and agricultural advancements require additional land, water and raw materials every year. This is done through fragmentation or destruction of natural habitats by filling wetlands, ploughing grasslands, cutting down trees, forest, desilting rivers, constructing transport ways, caving mountains, extracting, ores, etc.

(iii) The most dramatic example of habitat loss comes from the tropical rainforests 14% of the earth's land surface once covered by these tropical forests, is not more than 6% now. The Amazon rainforest, a vast area, harbouring millions of species, also called "Lungs of the planet" is destroyed and being replaced for agriculture and human settlements.

(iv) Kodaikanal and Nilgiri hills of Tamil Nadu have been destroyed rapidly for human occupancy. Loss of habitat results in annihilation of plants, microorganisms and forcing out animals from their habitats.

21. Where are biodiversity hotspots normally located? Why?

Ans. (i) Hotspots are areas characterized with high concentration of endemic species experiencing unusual rapid rate of habitat modification loss. **Norman Myers defined hot spots as "regions that harbour a great diversity of endemic species and at the same time, have been significantly impacted and altered by human activities."**

(ii) A hotspot is a region that supports at least 1500 endemic vascular plant species (0.5% of the global total) has lost more than 70% of its original vegetation.

(iii) There are 35 biodiversity hotspots in the world. India is home to **four** biodiversity hotspots. They are:

(1) **Himalaya:** Entire Indian Himalayan region.

(2) Western Ghats

(3) **Indo-Burma:** Entire North-eastern India, except Assam and Andaman group of Islands (and Myanmar, Thailand, Vietnam, Laos, Cambodia and Southern China)

(4) **Sundalands:** Nicobar group of Islands (and Indonesia, Malaysia, Singapore, Brunei, Philippines)

22. Why is biodiversity so important and worthy of protection?

Ans. Biodiversity is the variety of life on earth. That is, it is the number of different species of flora and fauna including microorganisms. These organisms can inhabit different ecosystems with varying conditions like the Rainforests, Coral reefs, Grasslands, Deserts, Tundra and the Polar ice caps. This variety (Biodiversity) is essential for the wellbeing of our planet and sustenance of life as a whole. The importance of biodiversity can be viewed and measured as:

a)Ecosystem services b) Biological resources c) Social benefits of biodiversity

The organization and functioning of ecosystems world over is effected and dependent on biodiversity and its richness. The major functional attributes are:

(i) Continuity of nutrient cycles or biogeochemical cycles (N_2, C, H_2O, P, S cycles)

(ii) Soil formation, conditioning or maintenance of soil health (fertility) by soil microbial diversity along with the different trophic members

(iii) Increases ecosystem productivity and provide food resources

(iv) Act as water traps, filters, water flow regulators and water purifiers (forest cover and vegetation)

(v) Climate stability (forests are essential for rainfall, temperature regulation, CO_2 absorption, which in turn regulate the density and type of vegetation)

(vi) Forest resource management and sustainable development

(vii) Maintaining balance between biotic components

(viii) Cleaning up of pollutants – microbes are the biggest degraders of molecules including many anthropogenic ones which are present in effluents, sewage, garbage and agro-chemicals

(ix) Ecological stability – the varieties and richness of species contribute to ecological stability and survival of species. Biodiverse regions are reservoirs of biological resources like food resources, gene pool, genetic resource, medicinal resources, bio-prospecting

(x) To provide unique aesthetic value and hotspots for Ecotourism. Along with forest resources and wildlife it has commercial significance

(xi) An indicator of the health of the ecosystem. Endemism is a crucial indicator of richness.

23. Why do animals have greater diversification than plant diversity?

Ans. More than 70% of species recorded on earth are animals and 22% are plants. This is because the animals have adapted themselves to ensure their survival in changing environments in comparison to plants. **Eg.** Presence of nervous system helps animals to control and co-ordinate their body structures. Therefore diversification in animals is more than in plants.

24. Alien species invasion is a threat to endemic species – substantiate this statement.

Ans. Exotic species (non-native; alien) are organisms often introduced unintentionally or deliberately for commercial purpose, as biological control agents and other uses.

They often become invasive and drive away the local species and is considered as the second major cause for extinction of species. Exotic species have proved harmful to both aquatic and terrestrial ecosystems. Examples are as follows:

(i) Tilapia fish (Jilabi kendai) (*Oreochromis mosambicus*) introduced from east coast of South Africa in 1952 for its high productivity into Kerala's inland waters, became invasive, due to which the native species such as *Puntius dubius* and *Labeo kontius* face local extinction.

(ii) Amazon sailfin catfish is responsible for destroying the fish population in the wetlands of Kolkata.

(iii) The introduction of the Nile Perch, a predatory fish into Lake Victoria in East Africa led to the extinction of an ecologically unique assemblage of more than 200 nature species of cichlid fish in the lake.

(iv) African apple snail (*Achatina fulica*) is the most invasive among all alien fauna in India. This mollusc was first reported in the Andaman and Nicobar Islands. It is now found across the country and threatens the habitat of several native species. Moreover it is becoming a vicious pest in vegetable farms.

(v) Exotic earthworms compete for food with native varieties and deplete their population in soil.

(vi) Papaya Mealy Bug (*Paracoccus marginatus*) is native of Mexico and Central America, is believed to have destroyed huge crops of papaya in Assam, West Bengal and Tamil Nadu.

25. Mention the major threats to biodiversity caused by human activities. Explain.

Ans. Even though India is one of the 17 identified mega diverse countries of the world, it faces lots of threats to its biodiversity.

(i) Apart from natural causes, human activities, both directly and indirectly are today's main reason for habitat loss and biodiversity loss.

(ii) Fragmentation and degradation due to agricultural practices, extraction (mining, fishing, logging, harvesting) and development (settlements, industrial and associated infrastructures) leads to habitat loss and fragmentation leads to formation of isolated, small and scattered populations and as endangered species.

(iii) Some of the other threats include specialised diet, specialized habitat requirement, large size, small population size, limited geographic distribution and high economic or commercial value.

(iv) Large mammals by virtue of their size require larger areas to obtain the necessities of life - food, cover, mates than do smaller mammals.

(v) Mammals have specialized dietary needs such as carnivores, frugivores and the need to forage over much larger areas than general dietary herbivores and omnivores.

(vi) Mammals also have low reproductive output other than small rodents.

Additional Questions

Choose the Correct Answer 1 Mark

I. Choose the Correct options for the below Questions

1. There are _____ mega biodiversity countries in the world
(a) 15 (b) 12
(c) 17 (d) 10 **[Ans. (c) 17]**

2. The Species–Area relationship was given by _____.
(a) Walter Rosen (b) Humboldt
(c) Wilson (d) Darwin
[Ans. (b) Humboldt]

3. The grizzled squirrel and lion tailed Macaque are endemic to_____
(a) Semi-Arid zone (b) Indian Desert
(c) Western Ghats (d) Eastern Ghats
[Ans. (c) Western Ghats]

4. _____ is a biographical gateway for much of India's flora and fauna.
(a) North East India
(b) Coastal Region
(c) Trans Himalayan region
(d) Sunderbans **[Ans. (a) North East India]**

5. _____ is not a threat to biodiversity.
(a) Fragmentation (b) Habitat loss
(c) Species diversity (d) Extinction
[Ans. (c) Species diversity]

6. _____ is not a exotic species.
(a) Amazon sailfin catfish (b) Mealy Bug
(c) Narcondam horn bills (d) Achatina fulica
[Ans. (c) Narcondam horn bills]

7. Death of _____ population is attributed to the medicine Diclofenac.
(a) Sparrow (b) Squirrel
(c) Vulture (d) deer
[Ans. (c) Vulture]

8. _____ is not a hotspot in India.
(a) Sunderbans (b) Pichavaram
(c) Himalayas (d) Western Ghats
[Ans. (b) Pichavaram]

9. IUCN has its headquarters in _____.
(a) New York (b) New Delhi
(c) Columbia (d) Switzerland
[Ans. (d) Switzerland]

10. The red data book is maintained by _____.
(a) WWF (b) ENVIS
(c) IUCN (d) NBA
[Ans. (c) IUCN]

11. Red list has _____categories.
(a) 7 (b) 6
(c) 8 (d) 12 **[Ans. (c) 8]**

12. At present there are _____tiger reserves in the country.
(a) 9 (b) 32
(c) 47 (d) 26 **[Ans. (c) 47]**

13. Project tiger was first launched in _____.
(a) 1973 (b) 1978
(c) 1999 (d) 2001
[Ans. (a) 1973]

14. Mundanthurai wild life sanctuary is located in _____ district.
(a) Coimbatore (b) Tirunelveli
(c) Kancheepuram (d) Nagapattinam
[Ans. (b) Tirunelveli]

15. Kaziranga in Assam refers to a _____.
(a) Protected areas
(b) Wild life sanctuary
(c) National park
(d) both a and c **[Ans. (d) both a and c]**

16. The headquarters of National Biodiversity Authority is located in _____.
(a) New Delhi (b) Dehradun
(c) Chennai (d) Kolkata
[Ans. (c) Chennai]

Very Short Answers — 2 Marks

1. Define species diversity.

Ans. Species diversity refers to the variety in number and richness of the species in any habitat.

2. What is ecosystem/community diversity?

Ans. Community/ecosystem diversity is the variety of habitats, biotic communities and ecological processes in the biosphere.

3. Give an equation for Species-Area relationship on a log scale.

Ans. $\log S = \log C + Z \log A$

where S = Species richness

A = Area

Z = Slope of the line (regression coefficient)

C = Y-intercept

4. What is habitat fragmentation?

Ans. Habitat fragmentation is the process where a large, continuous area of habitat is both, reduced in area and divided into two or more fragments.

Eg. Fragmentation of habitats like forest land into crop lands, orchard lands, plantations, urban areas, industrial estates

5. What is the role of Diclofenac?

Ans. Death of vulture population is attributed to the veterinary medicine Diclofenac, which is responsible for the thinning of the egg shells. This is an example for biodiversity loss by pollution.

6. Name the types of extinctions.

Ans. Natural extinction, mass extinction and anthropogenic extinction.

7. Mention any 4 categories of species in Red list.

Ans. (a) Extinct (b) Critically endangered
(c) Vulnerable (d) Not evaluated.

Short Answers — 3 Marks

1. Why has the dodo become extinct?

Ans. Excessive exploitation of a species, reduces the size of its population to such a level that it becomes vulnerable to extinction. Dodo has become extinct in the last 200-300 years due to over exploitation by humans.

2. What is an endangered species?

Ans. A species that has been categorized as very likely to become extinct is as endangered species.

3. What are exotic species?

Ans. The non-native or alien species of organisms are called exotic species. They are introduced. unintentionally or deliberately as biological control agents for or other uses.

Eg. Tilapia fish from East African Coast has been introduced into Kerala's inland water for its high productivity.

4. What is Co-extinction?

Ans. Co-extinction of a species is the loss of a species as a consequence of the extinction of another. (**Eg.** Orchid bees and forest trees by cross pollination).

5. What are hotspots?

Ans. Hotspots are areas characterized with high concentration of endemic species experiencing unusual rapid rate of habitat modification loss.

Eg. Western Ghats in India

6. What is extinction?

Ans. Species is considered extinct when none of its members are alive anywhere in the world.

Eg. DODO.

7. Why is extinction of species considered to be the most severe aspect in loss of biodiversity?

Ans. The most serious aspect of the loss of biodiversity is the extinction of species. The unique information contained in its genetic material (DNA), and the niche it possesses are lost forever.

8. What is IUCN?

Ans. The International Union for Conservation of Nature (IUCN) is an organization working in the field of nature conservation and sustainable use of natural resources. It was established in 1948 and located at Gland VD, Switzerland.

9. What is Red Data Book or Red list?

Ans. It is a catalogue of taxa facing risk of extinction. IUCN maintains the Red Data Book. It has eight categories of species.

10. What is the purpose of preparation of Red list?

Ans. *(i)* To create awareness on the degree of threat to biodiversity.

(ii) Provide global index on declining biodiversity.

(iii) Identification and documentation of species at the high risk of extinction.

Long Answers — 5 Marks

1. Write a note on extinction and its types.

Ans. Species is considered extinct when none of its members are alive anywhere in the world. If individuals of a species remain alive only in captivity or other human controlled conditions, the species is said to be extinct in the wild. In both of these situations, the species would be considered globally extinct. A species in considered to be locally extinct when it is no longer found in an area it once inhabited but is still found elsewhere in the wild.

Types of extinctions :

(i) **Natural extinction** is a slow process of replacement of existing species with better adapted species due to changes in environmental conditions, evolutionary changes, predators and diseases. A small population can get extinct sooner than the large population due to inbreeding depression (less adaptivity and variation).

(ii) **Mass extinction:** The earth has experienced quite a few mass extinctions due to environmental catastrophes. A mass extinction occurred about 225 million years ago during the Permian, where 90% of shallow water marine invertebrates disappeared.

(iii) **Anthropogenic extinctions:** These are abetted by human activities like hunting,habitat destruction, over exploitation, urbanization and industrialization. Some examples of extinctions are Dodo of Mauritius and Steller's sea cow of Russia. Amphibians seem to be at higher risk of extinction because of habitat destruction.

2. Write a note on gene banks.

Ans. *(i)* Gene banks are a type of biorepository which preserve genetic materials. Seeds of different genetic strains of commercially important plants can be stored in long periods in seed banks, gametes of threatened species can be preserved in viable and fertile condition for long periods using cryopreservation techniques.

(ii) However, it is not economically feasible to conserve all biological wealth and all the ecosystems. The number of species required to be saved from extinction far exceeds the conservation efforts.

3. Write the general strategies in conservation?

Ans. General strategies in conservation:

(i) identify and protect all threatened species

(ii) identify and conserve in protected areas the wild relatives of all the economically important organisms

(iii) identify and protect critical habitats for feeding, breeding, nursing, resting of each species

(iv) resting, feeding and breeding places of the organisms should be identified and protected

(v) Air, water and soil should be conserved on priority basis

(vi) Wildlife Protection Act should be implemented

(vii) There are two aspects of conservation strategies

(1) *In-situ* conservation

(2) *Ex-situ* conservation