

CHAPTER 5

BIODIVERSITY

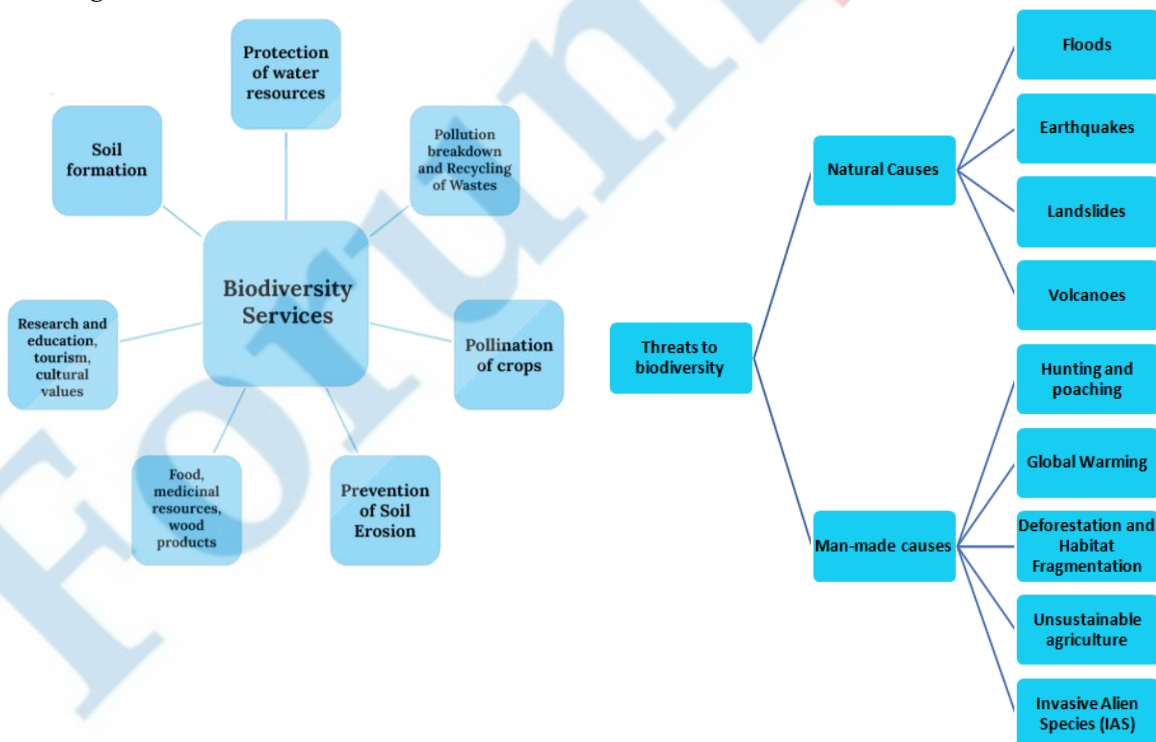
Biodiversity is a term used to describe the enormous variety of life on Earth. It is a measure of variation at the genetic, species and ecosystem level. **Terrestrial biodiversity is usually greater near the equator, which is the result of the warm climate and high primary productivity.** Mountains have high range of species at the low altitude as they can support larger number of species due to climatic condition.

There are **three levels of biodiversity**:

1. **Genetic diversity**- It is concerned with the variability of genes within a particular species. Genetic diversity allows species to adapt to changing environments and survive drastic changes. This ensures survival of the population.
2. **Species diversity**- It refers to the variety of living organisms on Earth.
3. **Ecosystem diversity**- It refers to different types of habitats like grasslands, desert, mangroves etc.

Biodiversity is measured using species richness. Species richness is the number of different species represented in an ecological community, landscape or region.

1. **Alpha diversity**- It refers to diversity within a particular area or ecosystem.
2. **Beta diversity**- It is a comparison of diversity between ecosystems.
3. **Gamma diversity**- It is a measure of overall diversity for the different ecosystems within a region.



As per **World Wildlife Fund's (WWF) Living Planet Report**, species extinction rate is 100-1000 times higher than a few hundred years ago. There are several constraints in biodiversity conservation like:

1. Low priority for conservation in policies.
2. Exploitation of biodiversity for monetary gains.
3. Limited knowledge regarding biodiversity and its importance.

- Unplanned urbanization resulting in destruction of wetlands, deforestation etc.

Considering the threats to biodiversity, there are two modes of conservation of the same:

- In-situ conservation**- It aims to enable biodiversity to maintain itself within the natural habitats in which it is found. E.g., National parks, sanctuaries, Biosphere reserves, reserved forests and protected forests.
- Ex-situ conservation**- It aims at conserving biodiversity outside the areas where they naturally occur. E.g., Seed banks and botanical gardens.

Reintroduction of Gangetic gharial in Chambal river flowing through Uttar Pradesh, Rajasthan and Madhya Pradesh where it had become extinct is an example of Ex-situ conservation.

A **botanical garden or botanic garden** is a garden dedicated to the collection, cultivation, preservation and display of a wide range of plants labelled with their botanical names.

It is an ex-situ mode of conservation.

Zoo is an establishment, whether stationary or mobile, where captive animals are kept for exhibition to the public and includes a circus and rescue centers but **does not include an establishment of a licensed dealer in captive animals.**

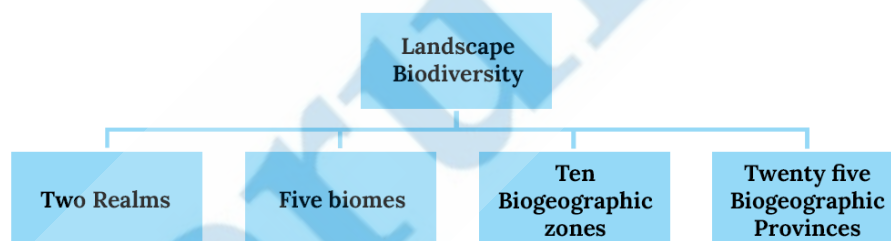
It is an ex-situ mode of conservation.

5.1 Indian Biodiversity

With just 2.4% of the land area, India accounts for nearly 7% of the recorded species. The varied climatic, edaphic and topographic conditions have resulted in a wide array of ecosystems and habitats in India with enormous biodiversity.

5.1.1 Landscape Biodiversity

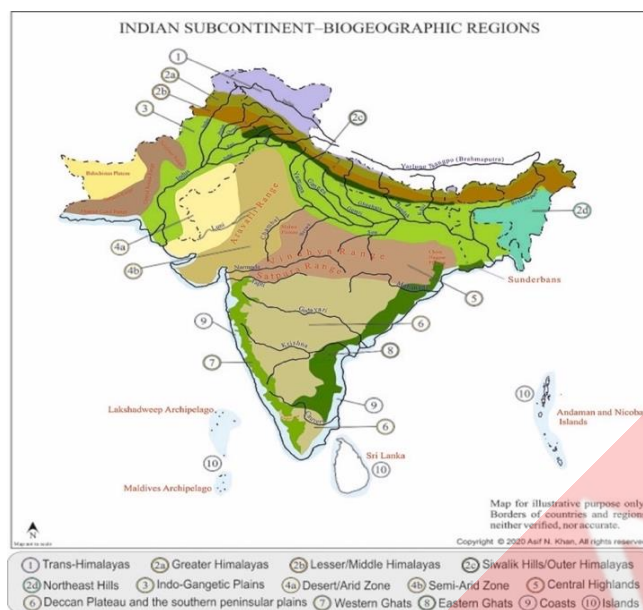
A landscape is a “mosaic of heterogeneous landforms, vegetation types and land uses.”



- Realms:** Realm is a continent or subcontinent sized area with unifying feature of geography, flora and fauna.

The Indian region is composed of two realms-

- The Himalayan region represented by **Paleartic Realm**.
 - Rest of subcontinent represented by **Malayan Realm**.
- Biomes:** A biome is a collection of plants and animals that have common characteristics for the environment they exist in. They can be found over a range of continents. The five biomes of India are Tropical Humid Forests, Tropical Dry or Deciduous Forests, Warm Deserts or Semi-deserts, Coniferous Forests and Alpine Meadows.
 - Biogeographic Zones:** Biogeography deals with the geographical distribution of plants and animals. The Himalayan range is very rich in species diversity due to confluence of different bio-geographical zones.



Picture Credits: Wikipedia

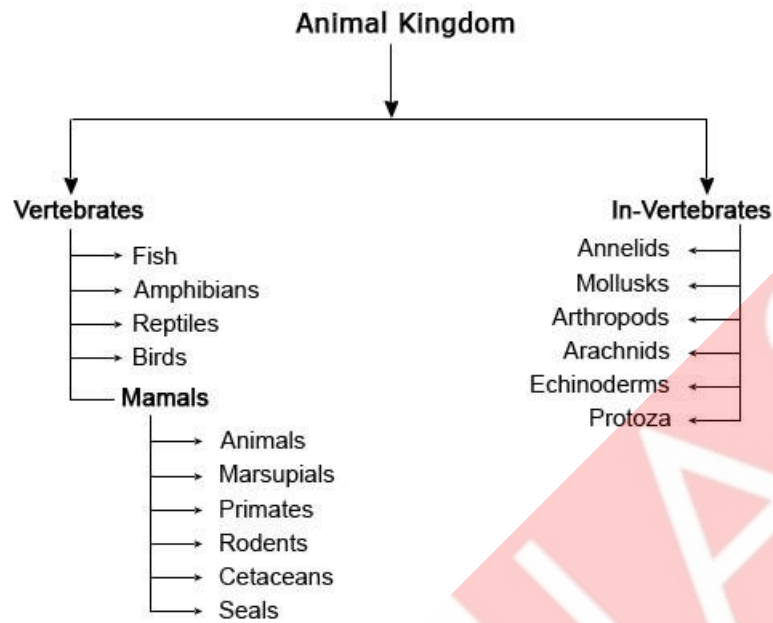
4. **Biogeographic provinces**- It is an Eco systematic or biotic subdivision of realms.

Sl. No	Biogeographic zones	Biogeographic provinces
1	Trans Himalaya	1. Himalayan-Ladakh Mountains 2. Himalaya-Tibetan Plateau 3. Trans-Himalaya Sikkim
2	The Himalaya	1. Himalaya-North West Himalaya 2. Himalaya- West Himalaya 3. Himalaya- Central Himalaya 4. Himalaya- East Himalaya
3	The Indian Desert	1. Desert- Thar 2. Desert- Kutch
4	The Semi-Arid	1. Semi- Arid- Punjab Plains 2. Semi- Arid- Gujarat Rajputana
5	The Western Ghats	1. Western Ghats- Malabar Plains 2. Western Ghats- Western Ghats Mountains
6	The Deccan Peninsula	1. Deccan Peninsular- Central Highlands 2. Deccan Peninsular- Chhota Nagpur 3. Deccan Peninsular- Eastern highlands 4. Deccan Peninsular- Central Plateau 5. Deccan Peninsular- Deccan South
7	The Gangetic Plains	1. Gangetic Plain- Upper Gangetic Plains 2. Gangetic Plains- Lower Gangetic Plains
8	The Coasts	1. Coasts- West Coast 2. Coasts- East Coast 3. Coasts- Lakshadweep
9	Northeast India	1. North- East- Brahmaputra valley 2. North- East- North East hills
10	Islands	1. Andaman and Nicobars

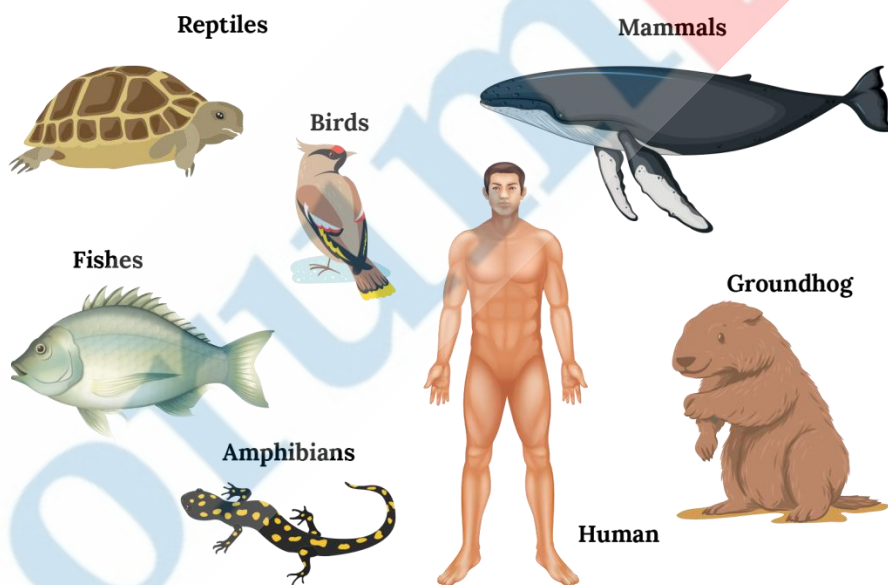
5.1.2 Fauna

India accounts for about 6.45% of the faunal species known world-wide.

CLASSIFICATION OF ANIMALS



1. **Vertebrates:** These are animals with backbones and spinal columns.



Basic facts:

1. Fishes and Reptiles are cold blooded.
 2. Amphibians are cold blooded animals. They live on both land and water and breathe with lungs and gills.
 3. Birds and Mammals are warm blooded.
2. **In-vertebrates:** These animals do not have backbones. More than 98% animal species in the world are invertebrates.

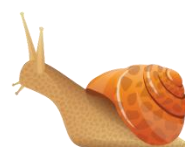
Animals without backbones



Protozoa



Annelids



Mollusks



Echinoderms



Crustaceans



Insects



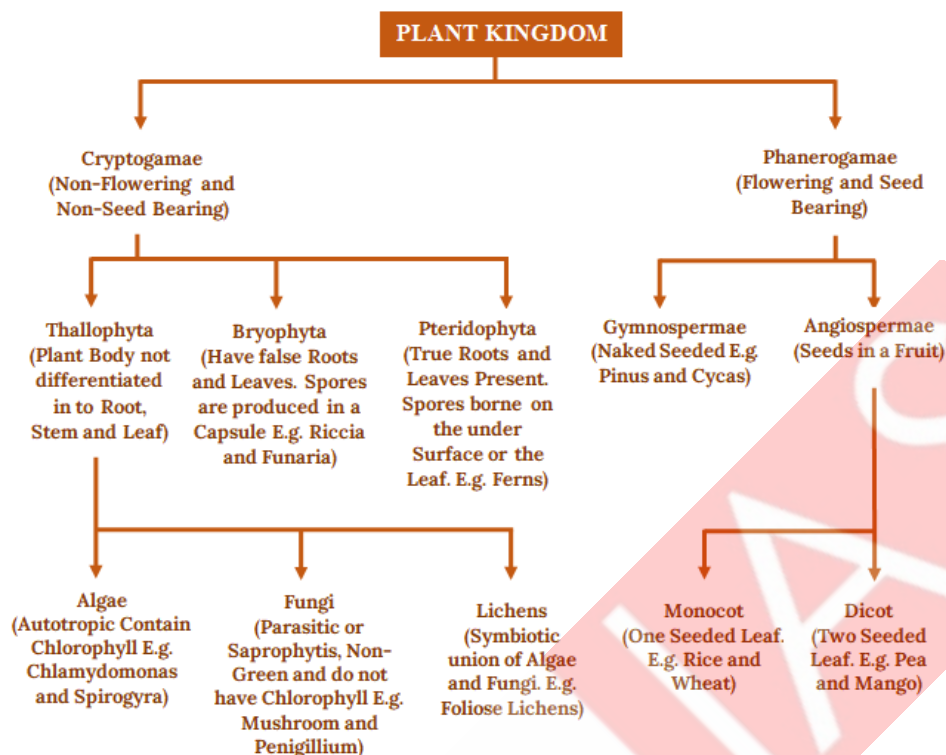
Arachnids

Basic facts:

1. **Annelids**
 - a. Their bodies are divided into segments
 - b. They do not have limbs
 - c. E.g., earthworm
2. **Mollusks**
 - a. They have a soft, skin like organ covered with a hard shell on the outside
 - b. E.g., octopus, squid, oyster
3. **Echinoderms**
 - a. Their bodies are covered in spikes or spine
 - b. They live in water
 - c. E.g., sea star, sea urchin
4. **Protozoa**
 - a. They are the smallest of all animals
 - b. Protozoa are simple, single celled animals
 - c. E.g., Amoeba, flagellates
5. **Arthropods**
 - a. They have limbs with joints that allow them to move
 - b. They also have an exoskeleton
 - c. Crustaceans, insects and arachnids are examples of arthropods
6. **Crustaceans**
 - a. They have a hard external shell protecting their body
 - b. E.g., crab, lobster
7. **Insects**
 - a. They consist of 3 body parts and 6 legs and an antenna
 - b. E.g., beetle, butterfly, bee
8. **Arachnids**
 - a. They have 2 body parts and 4 pair of legs
 - b. They do not have an antenna
 - c. E.g., spider, scorpions, tick and mites

5.1.3 Flora

India represents about 11% of the world's known floral diversity.



The **National Gene Bank** at National Bureau of Plant Genetic Resources (NBPGR), New Delhi; is the nodal organization in India for the management of plant genetic resources.

Floral biodiversity of India:

1. **Himalayan mountain system:**
 - a. Flora includes evergreen and semi-evergreen forests like rhododendrons, oak, pines, junipers, lichens and mosses.
2. **Peninsular- Indian sub-region:** It includes peninsular India as well as the desert region of Rajasthan (Thar desert).
 - a. Peninsular India has tropical moist deciduous to tropical dry deciduous and scrub vegetation like Sal in northern regions, teak in southern regions.
 - b. Western ghats have evergreen vegetation. Threatened with deforestation, unchecked urbanization and invasive species, Gadgil Committee and Kasturirangan Committee were formed to recommend sustainable development of Western Ghats region.
 - c. Indian desert of Rajasthan has flora like cacti and other succulents.
3. **Tropical rain forest regions:** They are distributed in the Western Ghat region and north-east India.
 - a. Evergreen vegetation like ebony trees is found here. Epiphytes and orchids are also found in this region. Stratification in rain forests is very distinct with multiple horizontal layers of trees.
4. **Andaman and Nicobar Islands:**
 - a. Tropical rainforests species are found in this region like Terminalia.

Pointers for prelims:

1. **Mycorrhizae** are symbiotic relationships that form between fungi and plants. The fungi colonize the root system of a host plant, providing increased water and nutrient absorption capabilities while the plant provides the fungus with carbohydrates formed from photosynthesis.
2. **Sandal tree** is a partial root-parasite, meaning that while it manufactures its own food, it also depends upon the host like other partial parasites for water and mineral nutrients.

Basic facts:

1. **Effect of Intensity of light** on the growth of plants
 - a. High light intensity favors plant growth while low intensity retards growth, flowering and fruiting.
 - b. Out of the 7 colours in the visible spectrum, only red is effective in photosynthesis.
 - c. Plant grown in blue light is small while red light causes elongation of cells resulting in etiolation.
 - d. Plants grown in UV and violet light are dwarf.
2. **Frost** can lead to killing of young plants due to damage to cells and formation of canker.
3. **Snow** results in mechanical bending of trees. However, it can also act as a blanket and prevent further drop in temperature, thus protecting seedlings from excessive cold and frost.
4. Excessive temperature disrupts the balance between respiration and photosynthesis, thereby causing depletion on food. It also increases susceptibility to bacterial and fungal attack. Further, there is desiccation of plant tissues and loss of moisture.
5. **Die back phenomenon** in trees like Sal, wherein there is progressive dying usually backwards from the tip of any portion of plant. Reason for this may include frost, drought, grazing, dense over-head canopy etc.

Insectivorous plants specialize in trapping insects. They have several attractions to lure insects like bright colours and sweet secretions. They hunt for insects despite having normal roots as they are usually found in nutrient poor soils. As a result, they have to hunt in order to replenish themselves.

Some of the insectivorous plants found in India are Drosera/Sundew, Aldrovanda/Pitcher plants, Nepenthes, Utricularia/Bladderworts and Pinguicula/Butterworts. Insectivorous plants have great medicinal properties like treating cholera, urinary tract infections, blisters. Some are also capable of curdling milk.

Invasive Alien Species (IAS) are species whose introduction and/or spread outside their natural past or present distribution threatens biological diversity.

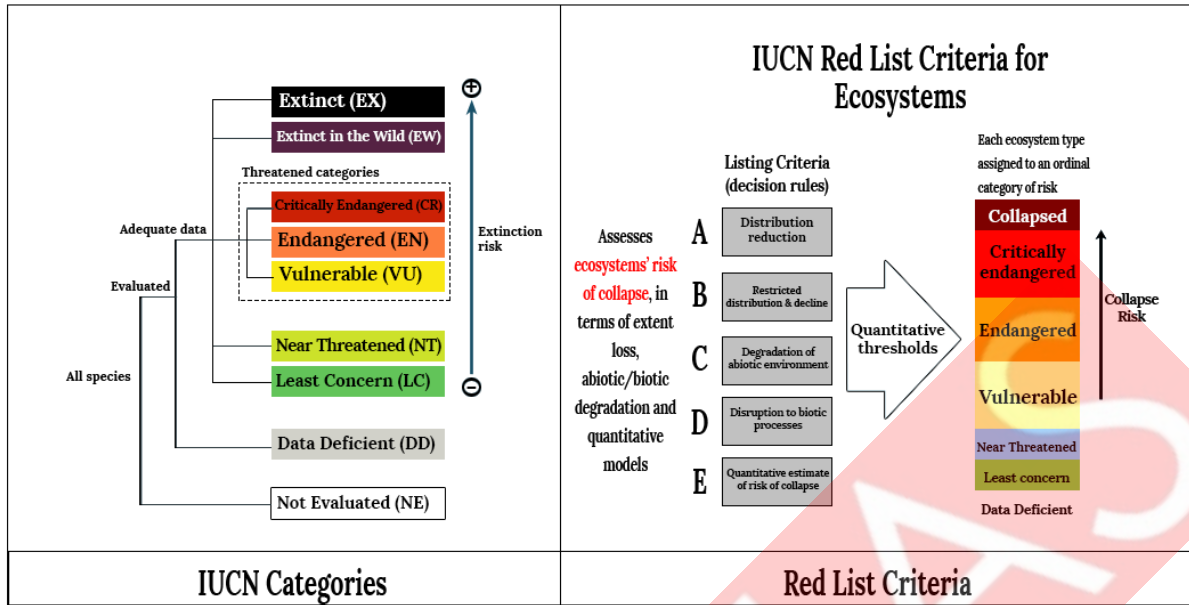
Some **invasive fauna** found in India are crazy ant, giant African snail, myna, goldfish and pigeon. Likewise, **invasive flora** of India includes Prosopis juliflora, water hyacinth, lantana camara, palmyra/toddy palm, black mimosa and black wattle.

Some **important medicinal plants** of India are as follows:

1. Kuth is used as an anti-inflammatory drug as well as making perfumes.
2. Ladies Slipper Orchid is used to treat insomnia/anxiety.
3. Sarpagandha is used for treating various central nervous system disorders.

5.1.4 IUCN Red Data Book

IUCN Red Data Book contains the complete list of threatened species, including both plants and animals. The pink pages in this book include the critically endangered species. Green pages are used for species that were formerly endangered but have now recovered to a point where they are no longer threatened.



ForumIAS

SUMMARY OF THE FIVE CRITERIA (A-E) USED TO EVALUATE IF A TAXON BELONGS IN AN IUCN RED LIST THREATENED CATEGORY (CRITICALLY ENDANGERED, ENDANGERED OR VULNERABLE).¹

A. Population size reduction. Population reduction (measured over the longer of 10 years or 3 generations) based on any of A1 to A4			
	Critically Endangered	Endangered	Vulnerable
A1	≥ 90%	≥ 70%	≥ 50%
A2, A3 & A4	≥ 80%	≥ 50%	≥ 30%
<p>A1 Population reduction observed, estimated, inferred, or suspected in the past where the causes of the reduction are clearly reversible AND understood AND have ceased.</p> <p>A2 Population reduction observed, estimated, inferred, or suspected in the past where the causes of reduction may not have ceased OR may not be reversible.</p> <p>A3 Population reduction projected, inferred or suspected to be met in the future (up to a maximum of 100 years) [(a) cannot be used for A3].</p> <p>A4 An observed, estimated, inferred, projected or suspected population reduction where the time period must include both the past and the future (up to a max. of 100 years in future), and where the causes of reduction may not have ceased OR may not be understood OR may not be reversible.</p>		<p>based on any of the following:</p> <p>(a) direct observation [except A3]</p> <p>(b) an index of abundance appropriate to the taxon</p> <p>(c) a decline in area of occupancy (AOO), extent of occurrence (EOO) and/or habitat quality</p> <p>(d) actual or potential levels of exploitation</p> <p>(e) effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites.</p>	
B. Geographic range in the form of either B1 (extent of occurrence) AND/OR B2 (area of occupancy)			
	Critically Endangered	Endangered	Vulnerable
B1. Extent of occurrence (EOO)	< 100 km ²	< 5,000 km ²	< 20,000 km ²
B2. Area of occupancy (AOO)	< 10 km ²	< 500 km ²	< 2,000 km ²
AND at least 2 of the following 3 conditions:			
(a) Severely fragmented OR Number of locations	= 1	≤ 5	≤ 10
(b) Continuing decline observed, estimated, inferred or projected in any of: (i) extent of occurrence; (ii) area of occupancy; (iii) area, extent and/or quality of habitat; (iv) number of locations or subpopulations; (v) number of mature individuals			
(c) Extreme fluctuations in any of: (i) extent of occurrence; (ii) area of occupancy; (iii) number of locations or subpopulations; (iv) number of mature individuals			
C. Small population size and decline			
	Critically Endangered	Endangered	Vulnerable
Number of mature individuals	< 250	< 2,500	< 10,000
AND at least one of C1 or C2			
C1. An observed, estimated or projected continuing decline of at least (up to a max. of 100 years in future):	25% in 3 years or 1 generation (whichever is longer)	20% in 5 years or 2 generations (whichever is longer)	10% in 10 years or 3 generations (whichever is longer)
C2. An observed, estimated, projected or inferred continuing decline AND at least 1 of the following 3 conditions:			
(a) (i) Number of mature individuals in each subpopulation	≤ 50	≤ 250	≤ 1,000
(ii) % of mature individuals in one subpopulation =	90–100%	95–100%	100%
(b) Extreme fluctuations in the number of mature individuals			
D. Very small or restricted population			
	Critically Endangered	Endangered	Vulnerable
D. Number of mature individuals	< 50	< 250	D1. < 1,000
D2. Only applies to the VU category Restricted area of occupancy or number of locations with a plausible future threat that could drive the taxon to CR or EX in a very short time.	-	-	D2. typically: AOO < 20 km ² or number of locations ≤ 5
E. Quantitative Analysis			
	Critically Endangered	Endangered	Vulnerable
Indicating the probability of extinction in the wild to be:	≥ 50% in 10 years or 3 generations, whichever is longer (100 years max.)	≥ 20% in 20 years or 5 generations, whichever is longer (100 years max.)	≥ 10% in 100 years

¹ Use of this summary sheet requires full understanding of the IUCN Red List Categories and Criteria and Guidelines for Using the IUCN Red List Categories and Criteria. Please refer to both documents for explanations of terms and concepts used here.

Picture Credits: IUCN

IUCN Species Survival Commission (SSC) is a science-based network of more than 7500 volunteer experts from almost every country of the world.

5.1.5 Schedule Animals of Wildlife Protection Act 1972 (WPA)

Wildlife Protection Act consists of 6 schedule lists, which give varying degrees of protection. Poaching, smuggling and illegal trade of animals listed Schedule 1 to Schedule 4 are prohibited.

1. Schedule 1 and part II of Schedule 2

- a. Animals listed under these have absolute protection.
- b. Examples of animals listed in Schedule 1 include lion tailed macaque, great Indian bustard, black buck, rhinoceros, dugong etc.
- c. Animals under Schedule 2 are dhole, flying squirrel etc.

2. Schedule 3 and Schedule 4

- a. These animals are also protected but the penalties for offenses against them are lower.
- b. Schedule 3 animals include hyena, nilgai, barking deer, hog deer etc.
- c. Schedule 4 animals include vultures etc.

3. Schedule 5

- a. Animals under Schedule 5 are called “vermin” and can be hunted.
- b. Mice, rat, common crow and flying fox are few examples

4. Schedule 6

- a. Cultivation, collection, extraction and trade of plants and its derivatives listed in Schedule 6 are prohibited.
- b. Plants under this include Red Vanda, Blue Vanda, Kuth, Pitcher plant, Laddies Slipper Orchid and Beddomes Cycad

Few important animals listed in Schedule 1 to 4 of WPA, 1972			
Sl. No	Name	Category	Range
1	Binturong	Vulnerable	Sikkim
2	Brow Antlered Deer/Sangai	Endangered	Keibul Lamjao National Park, Manipur
3	Swamp Deer	Vulnerable	Wide distribution
3	Cheetah	Vulnerable (Asiatic Cheetah is critically endangered and found in Iran only)	Extinct in India
4	Chinese Pangolin Indian Pangolin	Critically Endangered Endangered	Himalayan foothills
5	Clouded Leopard	Vulnerable	Himalayan foothills like Sikkim, W.B., North-east region etc.
6	Indian Gazelle (Chinkara)	Least Concern	Western and Central India
7	Dugong (Herbivorous marine mammals also known as Sea Cow)	Vulnerable	Coastal water belt
8	Fishing Cat	Endangered	Mangrove forests of Sundarbans
9	Ganges River Dolphin	Endangered	Indus, Ganga, Brahmaputra Meghna river system
11	Irrawaddy Dolphin (live in both fresh and salt water)	Endangered	Ganga, Brahmaputra, Irrawaddy and Mekong Rivers
10	Golden Langur	Endangered	North-east India
11	Hispid Hare	Endangered	West Bengal, UP, Assam, Bihar
12	Hoolock Gibbon	Endangered	Found in North-east India
13	Red Panda	Endangered	North-east India
14	Lion tailed macaque	Endangered	Western Ghats (Kerala, Tamil Nadu, Karnataka)
15	Malabar Civet	Critically Endangered	Western Ghats
16	Marbled Cat	Vulnerable	Eastern Himalayas to Southeast Asia

17	Himalayan Musk Deer	Endangered	Northeast India
18	Nilgiri Tahr	Endangered	Western Ghats
19	Greater One Horned Rhinoceros (Javan Rhino is known as Lesser One Horned Rhino)	Vulnerable	Assam is home to largest number of greater one horned rhinoceros, with more than 90% in Kaziranga National Park
20	Chiru (Tibetan antelope known for "Shantosh wool")	Endangered	Steppes and semi-arid desert areas of cold high mountains (e.g., Jammu and Kashmir)
21	Kiang (Wild Ass)	Least Concern	Cold Deserts of India
22	Tiger	Endangered	13 Tiger range countries
23	Indian Buffalo	Endangered	MP, Assam, Meghalaya
24	Northern River Terrapin (Batagur Baska)	Critically Endangered	Sundarbans, river estuaries
25	Olive Ridley Turtle Leatherback Turtle Loggerhead Turtle Hawksbill Turtle Green Turtle Indian Star Tortoise	Vulnerable Vulnerable Vulnerable Critically Endangered Endangered Vulnerable	Territorial and Fresh waters
26	Bengal Florican	Critically Endangered	Indian Subcontinent (UP, Assam)
28	Chital	Least Concern	Sikkim region
29	Hogdeer	Endangered	North and Northeast India
30	Nilgai	Least Concern	Widely distributed in India
31	Barking Deer (Muntjac)	Least Concern	
32	Dhole	Endangered	Western Ghats, Eastern Ghats, Northeast India etc.
33	Great Indian Bustard	Critically Endangered	Central and Western India (e.g., Desert National Park, Rajasthan)
34	Mouse Deer	Least Concern	Deciduous and Evergreen Forests
35	Asiatic Lion (found in India only)	Endangered	Limited to only 5 protected areas in Gujarat-Gir National Park, Gir Sanctuary, Pania sanctuary, Mitiyala Sanctuary, Girnar Sanctuary
36	Elephant	Endangered	Wide range throughout India
37	Eurasian Otter (carnivorous animals)	Near Threatened	Western Ghats
38	Ganges Shark	Critically Endangered	River Hooghly in West Bengal, as well as river Ganges, Brahmaputra and Mahanadi
39	Indian Ocean Humpback Whale	Endangered	Shallow water of Indian Ocean
40	Snow Leopard	Vulnerable	J&K, Himachal Pradesh, Uttarakhand, Sikkim, Arunachal Pradesh
41	Saltwater Crocodile	Least Concern	Bhitarkanika, Odisha houses 70% of these species.

Pointers for prelims:

1. **Irrawaddy Dolphins** are included in Schedule I of WPA 1972.
 - a. They are found in large numbers in Chilika Lake.
2. **Chinnar Wildlife Sanctuary**, Kerala is the only rehabilitation center for star tortoises in the country.
3. **Great Indian Bustard**, locally known as Godawan in Rajasthan, is the heaviest of all flying birds found in arid and semi-arid grasslands.
 - a. It is the state bird of Rajasthan listed under Schedule I of WPA and CMS or Bonn Convention.
 - b. It is endemic to the Indian Sub-continent and is found in only six states: MP, Gujarat, Maharashtra, Andhra Pradesh, Rajasthan and Karnataka.
4. **Amur Falcon** is a migratory bird that stays every year at Doyang Lake (Nagaland) during their flight from Mongolia to South Africa.
5. **Nilgiri Tahr** is the state animal of Tamil Nadu, listed under Schedule 1 of WPA. It is endemic to Western Ghats.
 - a. Majority of Nilgiri Tahr are found at the Eravikulam National Park in Munnar, Kerala.
6. **Asiatic Lion** is listed under Schedule I of WPA and Appendix-I of CITES is found in India only.
 - a. Several Asiatic Lions died due to Canine Distemper Virus (CDV) and tick borne Babesiosis in Gir Forest, Gujarat.
 - b. Considering this, MoEFCC has launched Asiatic Lion Conservation Project under the Centrally Sponsored Scheme-Integrated Development of Wildlife Habitat (CSS-IDWH).
 - c. There was also a proposal to translocate lions from Gujarat to Kuno-Palpur Wildlife Sanctuary, Madhya Pradesh.
7. **Spider Monkey**, found in Central and South America, are called so as they look like spiders hanging upside down from their tails with their arms and legs dangling.
8. **Sarus Crane**, the state bird of UP has been classified as Vulnerable by IUCN.
 - a. It generally inhabits natural wetlands.
 - b. They are large non-migratory crane and India's only resident breeding crane and world's tallest flying bird.
9. **Tamil Yeoman**, a butterfly species endemic to Western Ghats has been declared as the state butterfly of Tamil Nadu while Maharashtra declared Blue Mormon as its state butterfly.
10. **Kharai camels**, found in the Kutch region of Gujarat, can swim up to three kilometers in the sea in search of mangroves. Many Jatt families in the region are traditional rearers of Kharai camels.
11. **Purple Frog (*Nasikabatrachus Sahyadrensis*)** is listed as Endangered by IUCN. It is endemic to Western Ghats and can be called as 'living fossil' as its evolutionary roots suggest it could have shared space with dinosaurs.
12. **Orangutans** are one of the world's three surviving species of great apes and are native to Indonesia and Malaysia.
 - a. It has been classified as Critically Endangered by IUCN.
13. **Chinkara gazelles** have been classified as Least Concern by IUCN.
 - a. Karnataka has notified Bukkapatna Chinkara Wildlife Sanctuary as the southernmost tip in the distribution range of Chinkara in India.
14. **Flame Throated Bulbul** is the State Bird of Goa and is endemic to the southern peninsular India.
15. **Pangolins** are the most trafficked wildlife species.
 - a. They are known as scaly anteaters and are toothless animals.
 - b. They are the only mammal wholly covered in scales.

The **hump-backed mahseer**, found in the waters of the Cauvery has been added to the IUCN Red List as Critically Endangered.

Gangetic Dolphins, also known as 'susu' is the national aquatic animal and has been granted non-human personhood status by the government. It is also called a blind dolphin.

1. It is listed under Schedule I of WPA 1972.
2. It is among the four freshwater dolphins found in the world.
3. Its population is declining due to poaching, construction of dams, getting trapped in fishing nets and agricultural run-off from fields.
4. Vikramshila Gangetic Dolphin Sanctuary in Bihar is India's only sanctuary for the Gangetic Dolphin.

Indus Dolphins, also known as 'bhulan' are endangered, freshwater and functionally blind species of dolphins.

1. A very small population is found in India's Beas river.
2. Punjab has recently declared it as its state animal.
3. Indus dolphins rely on echolocation to navigate, communicate and hunt down their prey.

India is home to nine species of vulture. Some of the important ones facing extinction include:

1. Critically Endangered Species- Slender Billed Vulture, Indian Long Billed Vulture, Oriental White-backed Vulture, Red Headed Vulture.
2. Endangered Species- Egyptian Vulture.

Accordingly, Vulture Care Centre (VCC) was set up at Pinjore, Haryana. Later, it was upgraded to become the first Vulture/Jatayu Conservation and Breeding Centre (VCBC) in India.

Bird Conservation:



STATE OF INDIA'S BIRD 2020 Report

The 'State of India's Birds 2020' (SOIB) report was released at the ongoing United Nations 13th Conference of the Parties to the Convention on Migratory Species in Gandhinagar, Gujarat.

Key Findings

- 867 species of Indian birds assessed in this report.
- 52% of species show clear declines over the past decades.
- 101 species classified as of 'High Conservation Concern' such as the Rufous-fronted Prinia, Nilgiri Thrush, Nilgiri Pipit and Indian vulture.
- The numbers of the Indian Peacock has increased dramatically over the past few decades.
- The number of House Sparrows has decreased in large cities but it is roughly stable across the country.
- All the four species of Bustards in India (the Great Indian Bustard, Macqueen's Bustard, Lesser Florican and Bengal Florican) have suffered continuous population decline.

1. **Important Bird Area (IBA)** is an area identified by BirdLife International as being globally important for the conservation of bird populations. Sites under IBA does not ensure that it gets legal protection or becomes inaccessible to people.

2. **Salim Ali Centre for Ornithology and Natural History (SACON)** is registered as a society and Union Environment Minister is the president.
3. **Draft Visionary Perspective Plan to Conserve Birds** has been placed in the public domain. Key highlights of the plan include:
 - a. Bird Surveys will be conducted in selected landscapes.
 - b. Species recovery programme of critically endangered birds is envisaged.
 - c. Aims at conservation of migratory birds.
 - d. SACON will be the nodal institution for this purpose.

Thousands of migratory birds recently died at Sambhar lake in Rajasthan due to **Avian Botulism**. Avian Botulism is caused by Clostridium botulinum bacteria which affects the nervous system of birds leading to paralysis.

Olive Ridley Turtles are one of the smallest and most abundant of all sea turtles found in the world.

1. Gahiramatha marine sanctuary, located in Odisha, is known as world's largest Olive Ridley rookery.
2. They are known for their mass nesting called Arribada.
3. They are carnivores in nature.
4. Operation Olivia has been launched by Indian Coast Guard to ensure the safety of Olive Ridley Sea Turtles.

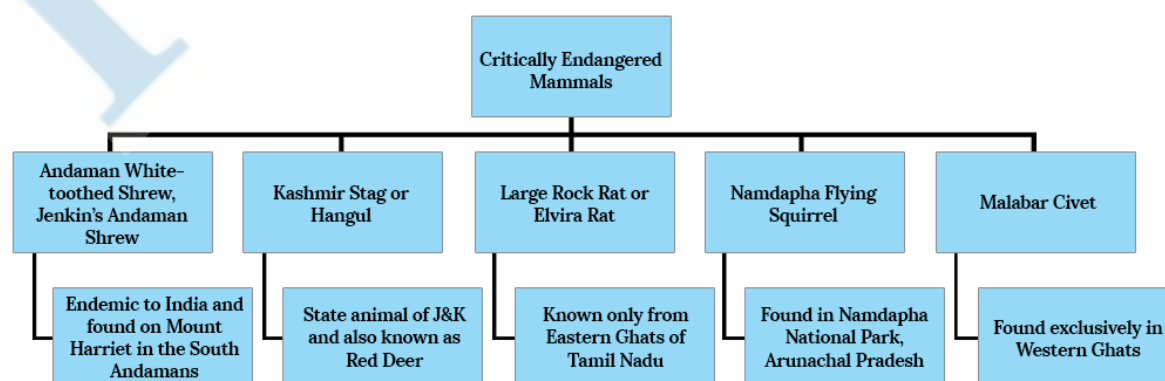
WCCB and UN Environment India launched an awareness campaign '**Not all animals migrate by choice**' to garner public support for the protection and conservation of wildlife, prevention of smuggling and reduction in demand for wildlife products.

Integrated Development of Wildlife Habitats (IDWH) is a Centrally Sponsored Scheme where government provides financial and technical assistance to State/UT governments for wildlife conservation. The Scheme has following components:

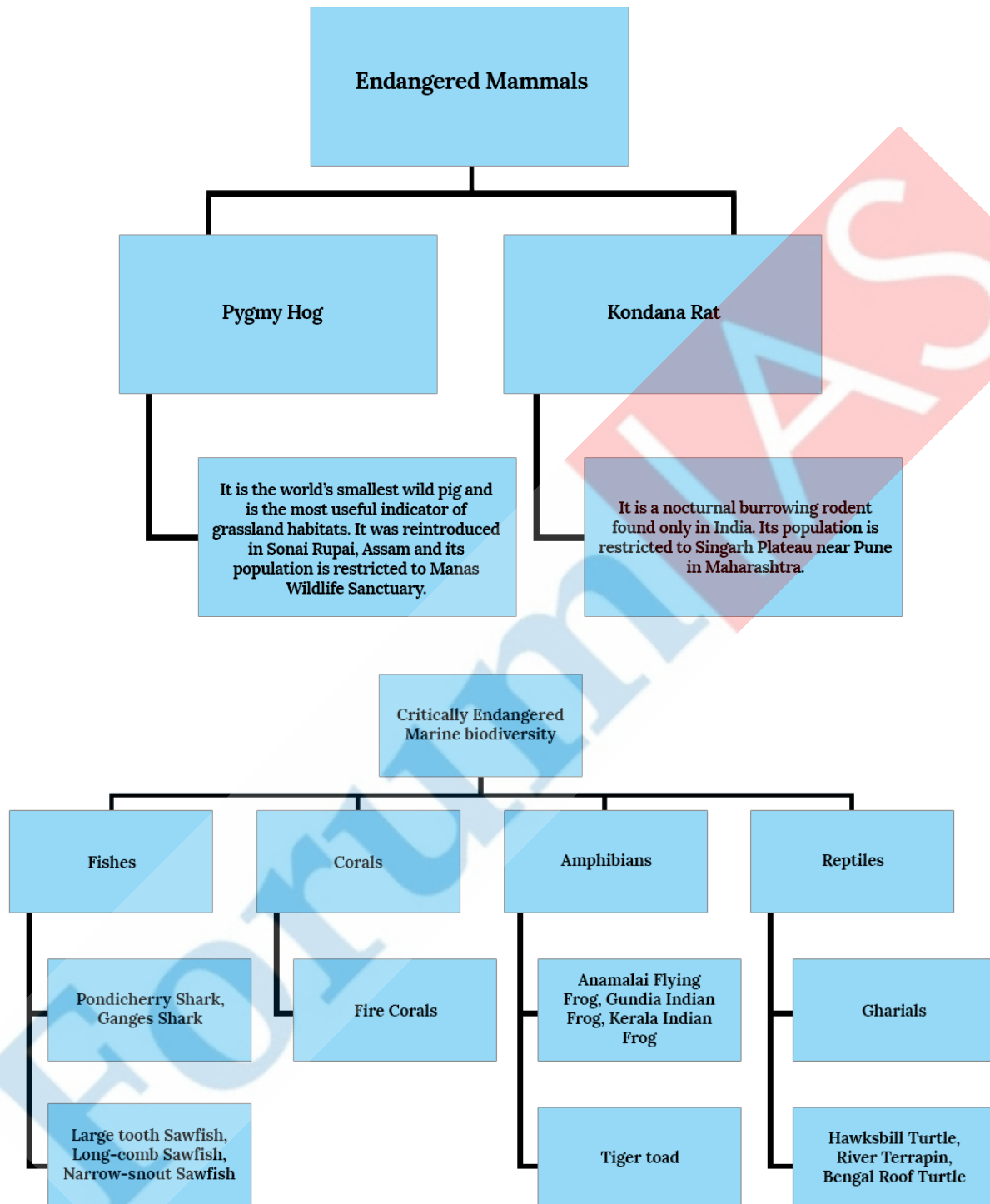
1. Support to Protected Areas like National Parks and Wildlife Sanctuaries.
2. Protection of Wildlife Outside Protected Areas.
3. Recovery Programme for saving Critically Endangered Species and Habitats.

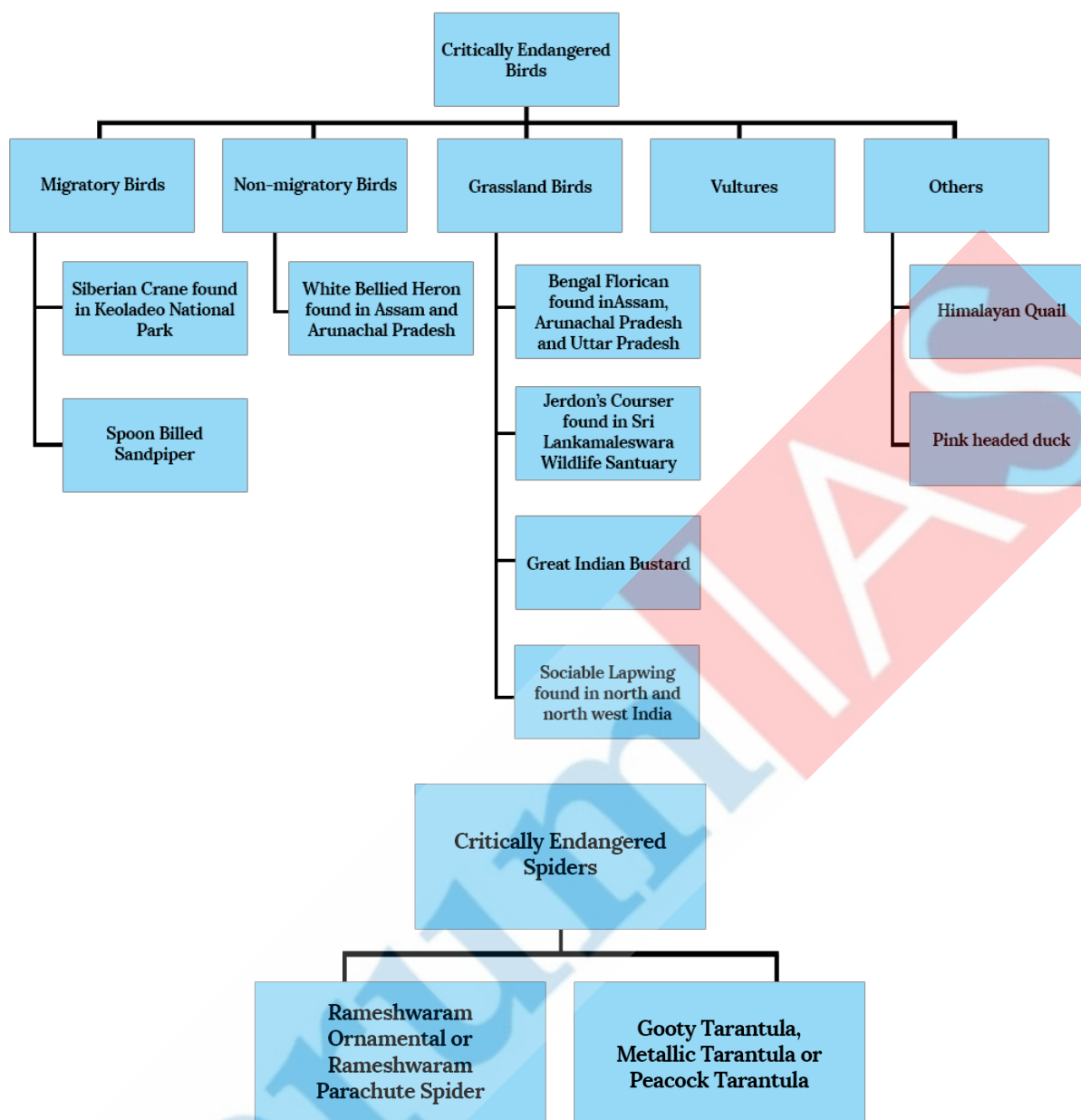
It covers 17 species, some of which are Snow Leopard, Bustard (including floricans), Dolphin, Hangul, Nilgiri Tahr, Dugongs, Manipur Brow Antlered Deer, Malabar Civet, Indian Rhinoceros, Asiatic Lion, Swamp Deer, Jerdon's Courser etc.

5.1.6 Animal Diversity of India



Endangered Mammals





Some recent changes to IUCN status:

1. **Forest Owlet's** status has been changed from Critically Endangered to Endangered.
 - a. It is found in dry deciduous forests of MP and Maharashtra.
2. **Sispara Day Gecko's** status has been changed from Critically Endangered to Near Threatened.
3. **Knife-tooth Sawfish's** status has been changed from Critically Endangered to Endangered.

Duck-billed platypus and some species of anteaters are few exceptions as despite being mammals, they lay eggs rather than giving birth to young ones. All of them are found only in Australia and New Guinea.

5.1.7 Marine Organisms

1. **Plankton:** It refers to both microscopic plants like algae (phytoplanktons) and animals like crustaceans and protozoans (zoo-planktons) found in all aquatic ecosystems except certain swift moving waters.

- a. Locomotory power of planktons is limited and their distribution is largely controlled by water current.
2. **Phytoplankton:** Phytoplankton are the autotrophic components of the plankton community and a key part of ocean and freshwater ecosystems. All phytoplankton have chlorophyll and carry out photosynthesis. Thus, they also act as a Carbon Sink by removing CO₂ naturally during photosynthesis.
 - a. Common kinds of phytoplankton are cyanobacteria, protists and green algae.
 - b. They are present throughout the lighted regions of all the seas and oceans including the Polar Regions and their total biomass is greater than that of total plants on land. However, their distribution is limited to the uppermost layers of the oceans where light intensity is sufficient for photosynthesis.
 - c. The highest concentration of phytoplanktons is found at higher latitudes, while the tropics and subtropics have 10 to 100 times lower concentrations.
3. **Zooplanktons:** They are the animal component of the planktonic community. They are heterotrophic, meaning they cannot produce their own food and must consume instead other plants or animals as food. In particular, this means they eat plankton.
 - a. Examples of zooplankton include tiny flagellates and giant jellyfish.
4. **Sea-grass:** They are marine flowering plants that resemble grass in appearance. They grow in shallow coastal waters with sandy or marshy bottoms and require comparatively calm areas. Sea-grass beds serve variety of purposes like:
 - a. Reducing wave energy.
 - b. Filtering sediments and nutrients from water.
 - c. Controlling erosion.
 - d. Serves as habitat for marine fauna.
5. **Seaweeds:** They are microscopic algae, meaning that they have no differentiation of true tissues such as roots, stems and leaves. Functions of seaweeds include:
 - a. They are important as food for humans.
 - b. They are used as a drug for goitre treatment.
 - c. Commercial products like agar-agar, alginates and iodine can be extracted from them.
 - d. Biodegradation of seaweeds can produce methane.
 - e. They serve as indicators of marine pollution.
 - f. Other general functions are similar to sea-grass.