

ZOOGEOGRAPHY OF INDIA – FOREST TYPES

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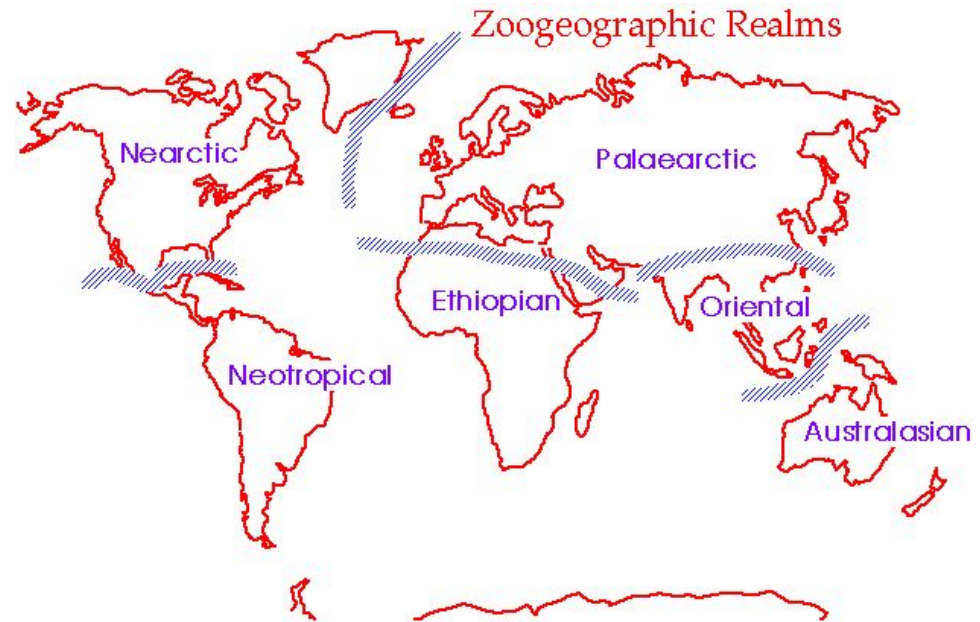






Zoogeography of world

- Zoogeography is the study of the patterns of the past, present, and future distribution of animals in nature and the processes that regulate these distributions. It is the scientific analysis of the spatial patterns of biodiversity.



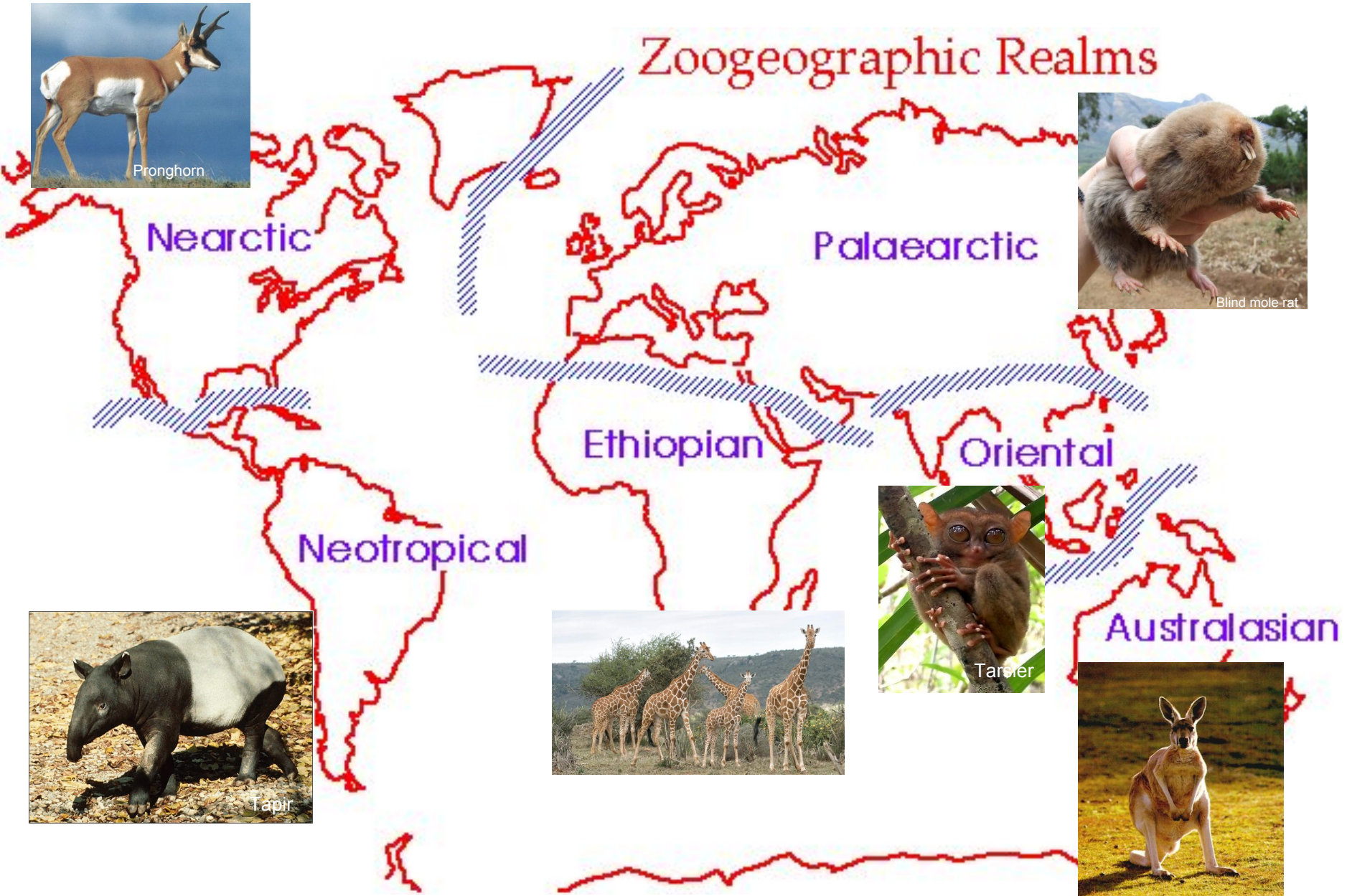
Nicobar megapode

- Oriental region: India, Indochina, and southern China, Malaya archipelago including Bali, Java, Sumatra and the Philippine islands.
- Primarily tropical with some exceptional areas having sub tropical to temperate (Himalayan region) and semi arid to arid (western region) conditions.
- The eastern parts are covered mostly with tropical rain forest and it shades into dry desert conditions as one moves westward.

Indigenous Peoples of the World

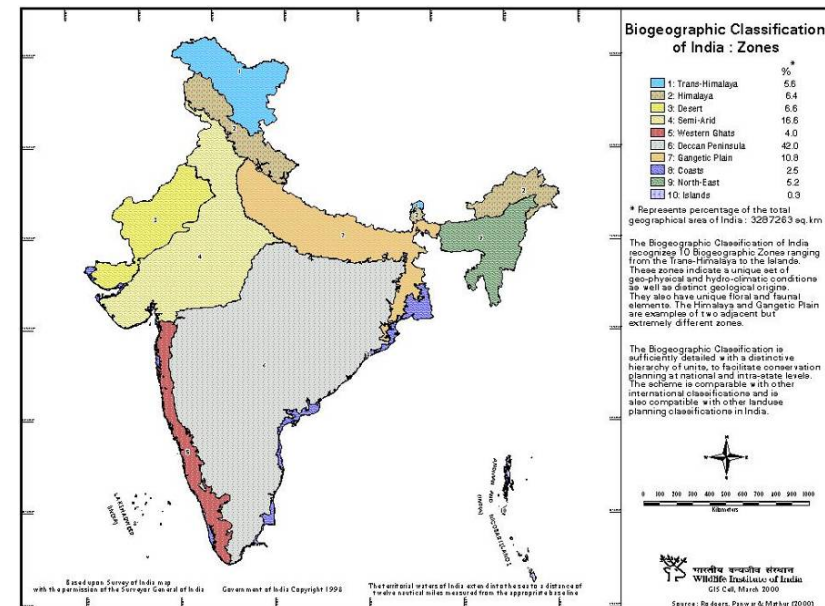


ZOOGEOGRAPHIC REALMS (WALLACE 1897)



The Indian Zoogeography...

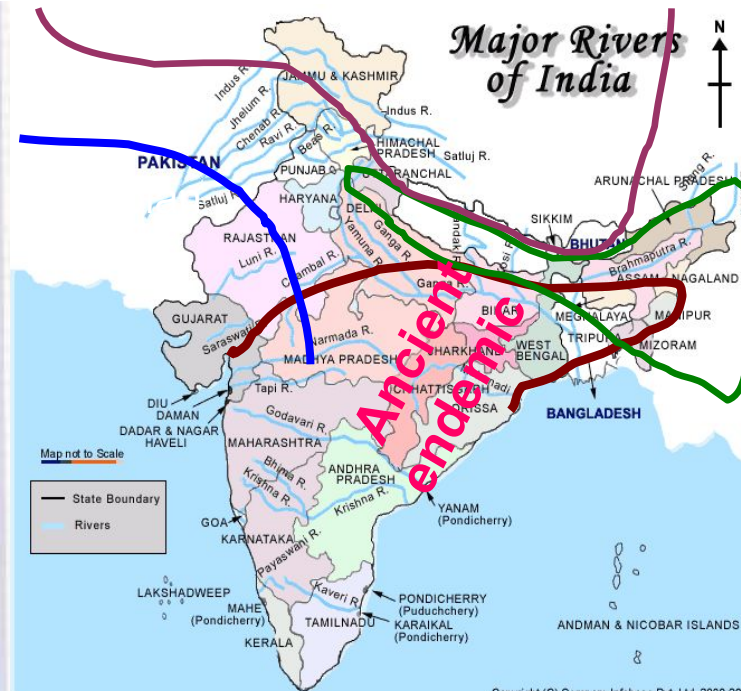
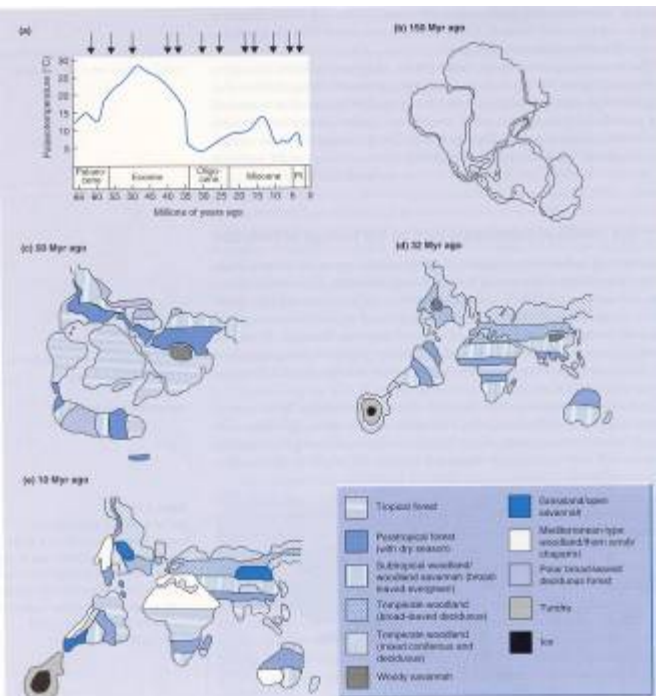
- ◆ India is also one of the 9 '*Vavilovian centers of origin and diversity of crop plants*'
- 4 India is also amongst 17 '*mega-biodiverse*' countries and has 4 '*biodiversity hot-spots*'
- 4 India is amongst the few countries in the world that has developed a conservation planning framework on biogeographic basis
- 4 India conservation estate is ca. 21.34% of its total geographic area



more...

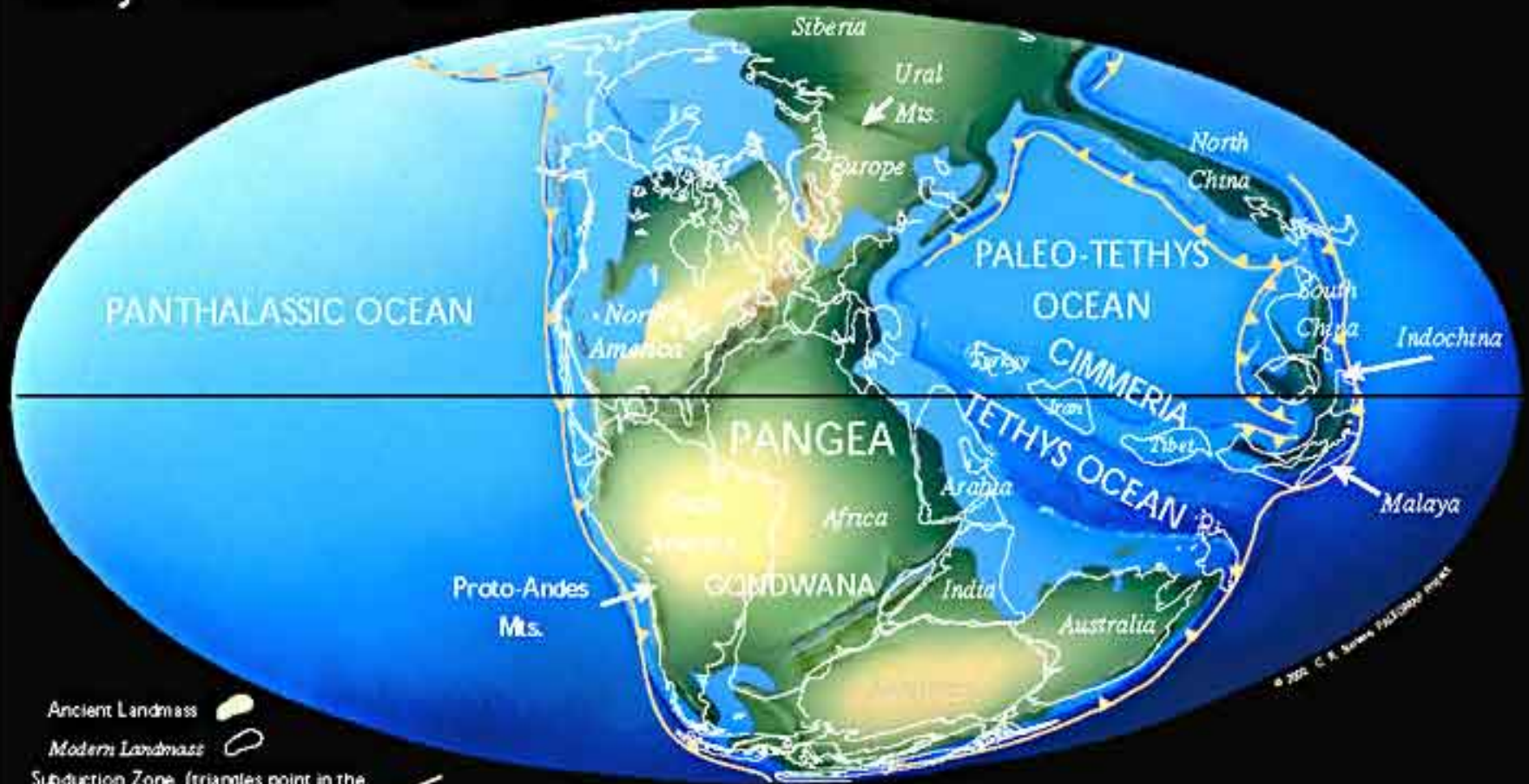
... unique biodiversity

- African element: Hyena and Gazelle
- European element: Wolf, Wild Goat, Hangul
- South east asian: Hoolock Gibbon and Elephant
- Hundreds of endemic species



Pangea

Early Triassic 237 Ma



Ancient Landmass

Modern Landmass

Subduction Zone (triangles point in the direction of subduction)





Sea Floor Spreading Ridge

© 2002 C. R. Scotese, Paleogeography Project

Gondwanaland

Late Jurassic 152 Ma

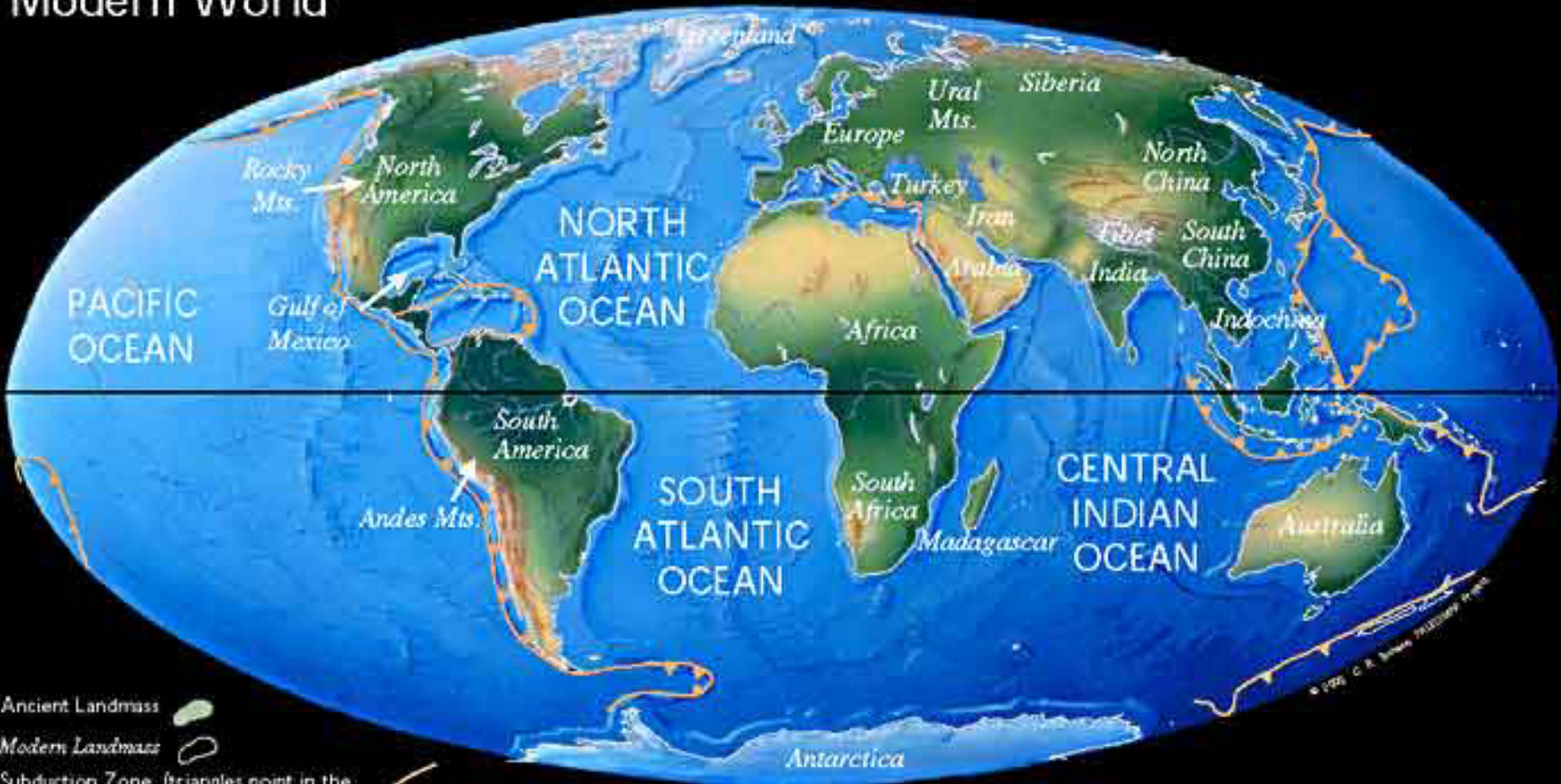


- Ancient Landmass 
- Modern Landmass 
- Subduction Zone (triangles point in the direction of subduction) 
- Sea Floor Spreading Ridge 

© 2005 C. R. Scotese, DGLSDMAP 05042

Modern World

Modern World

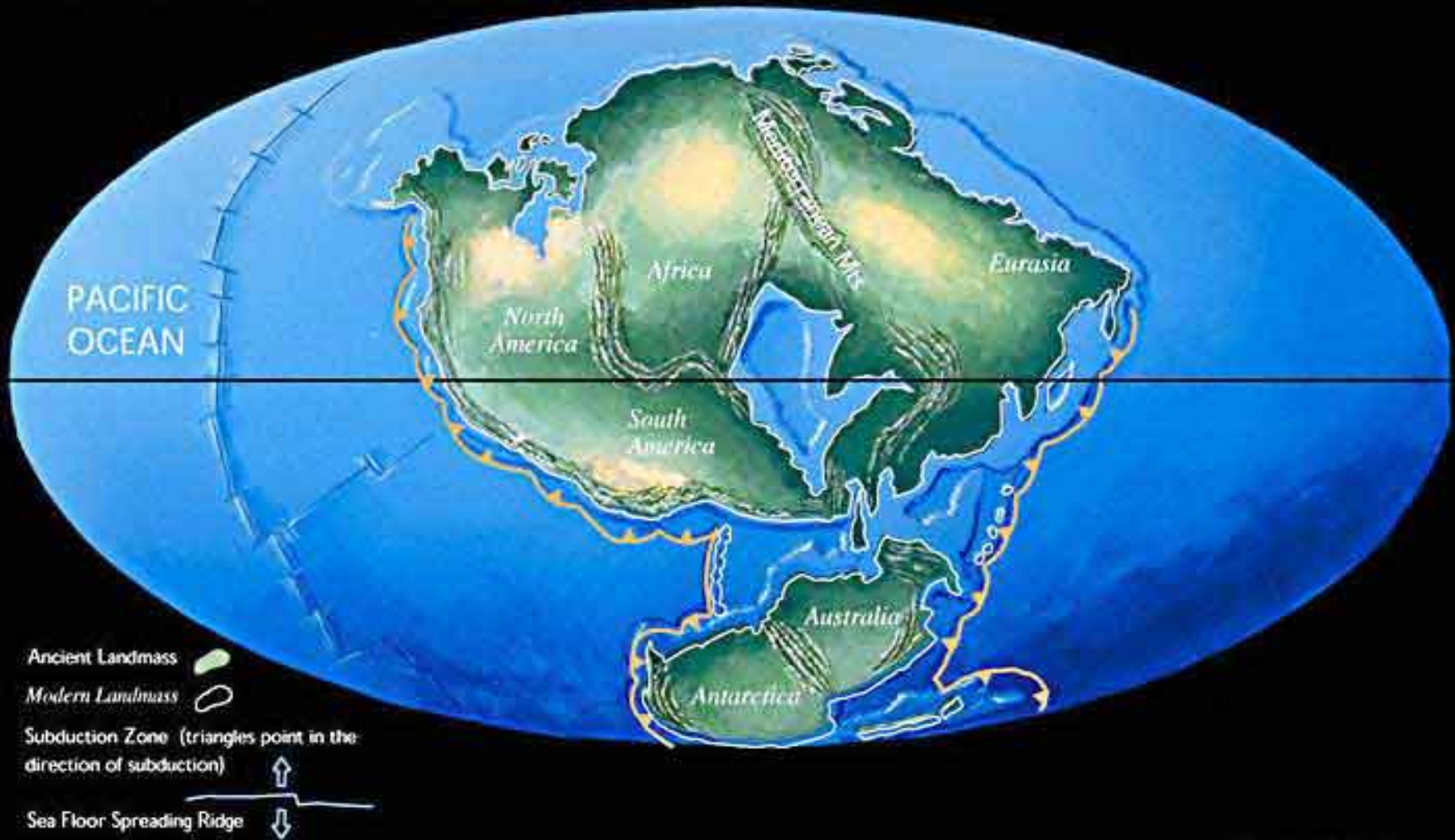


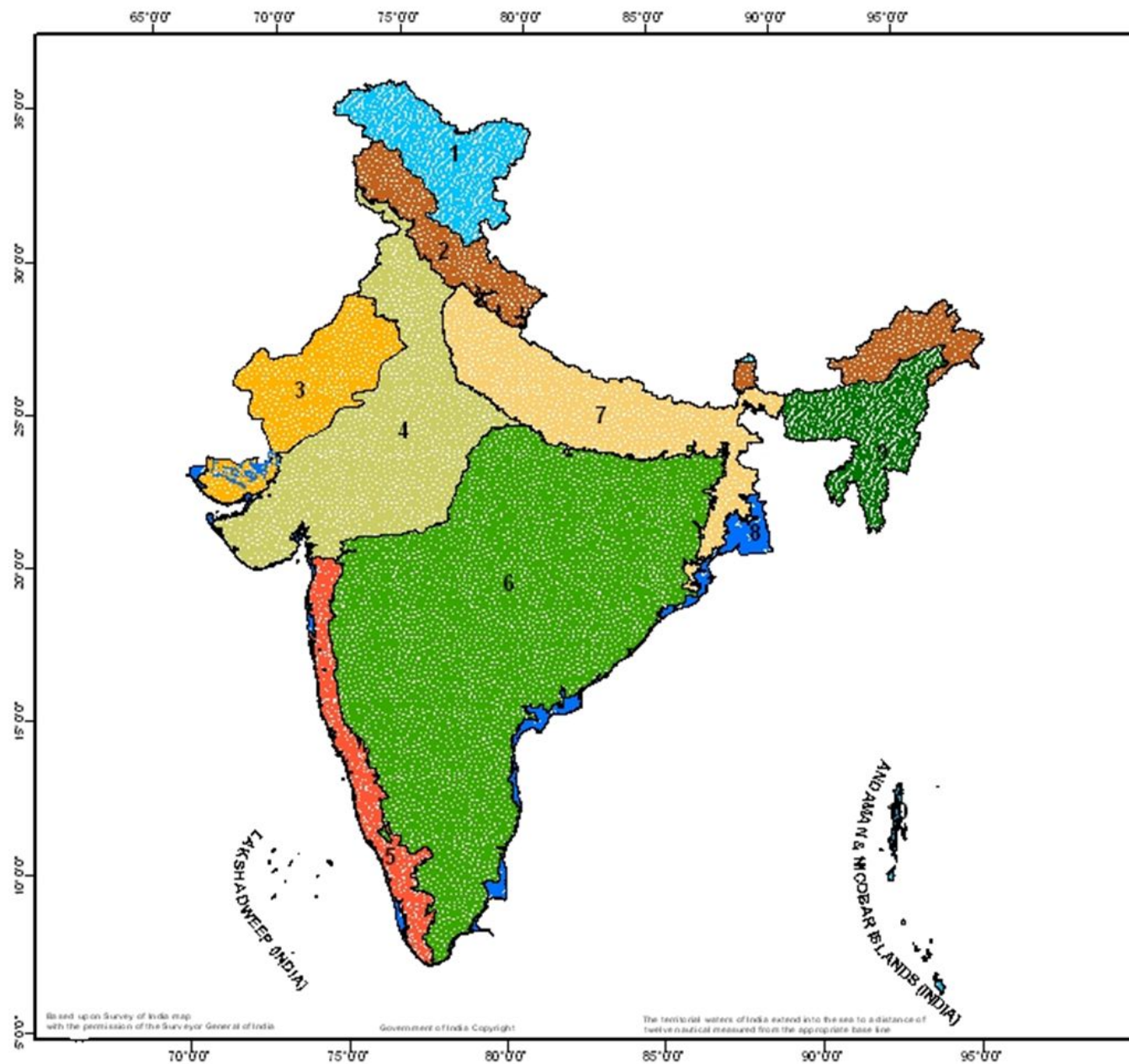
- Ancient Landmass
- Modern Landmass
- Subduction Zone (triangles point in the direction of subduction)
- Sea Floor Spreading Ridge

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Future

Future World + 250 Ma





Biogeographic Classification of India : Zones

| | % * |
|------------------------|-------------|
| 1 : Trans - Himalaya | 5.6 |
| 2 : Himalaya | 6.4 |
| 3 : Desert | 6.6 |
| 4 : Semi - Arid | 16.6 |
| 5 : Western Ghats | 4.0 |
| 6 : Deccan Peninsula | 42.0 |
| 7 : Gangetic Plain | 10.8 |
| 8 : Coasts | 2.5 |
| 9 : North East | 5.2 |
| 10 : Islands | 0.3 |
| Marine Influenced Area | 10440 sq.km |

* Represents percentage of the total geographical area of India : 3287263 sq.km



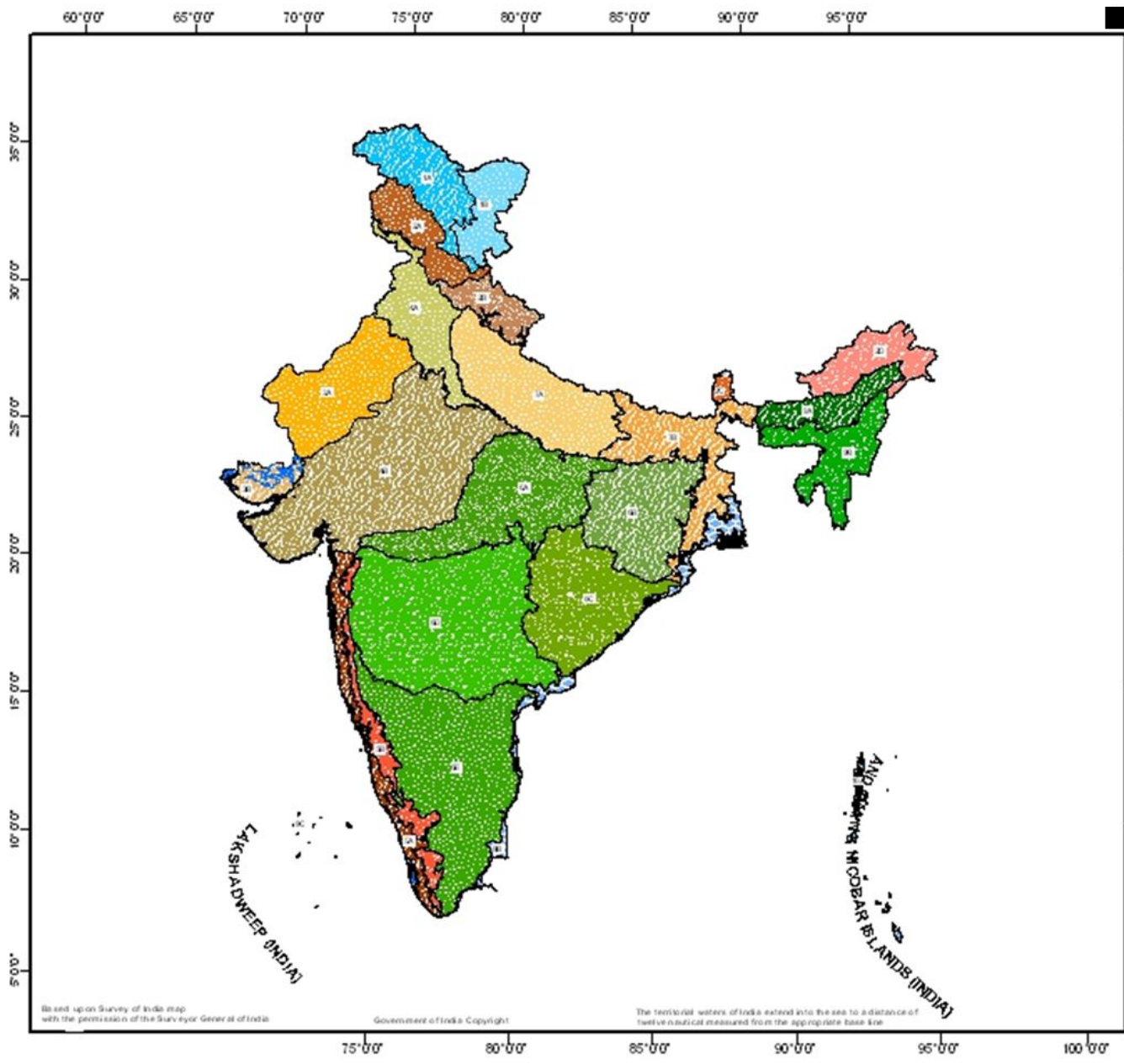
BIOGEOGRAPHIC CLASSIFICATION

BIOGEOGRAPHIC ZONE Distinctive set of physical and Historical conditions.
e.g. Himalayas & desert

BIOTIC PROVINCE Further level of detail within zone.
Contains some distinctive species elements.
e.g. Western & Eastern Himalayas

BIOGEOGRAPHIC REGION Distinctive geographic subdivision.
e.g. Garhwal & Kumaon in Western Himalayas

BIOMES Major ecosystem groupings found
Within each province and region.
e.g. Alpine, Subalpine, Temperate Conifer
Forest within Western Himalayas



Biogeographic Classification of India : Provinces

| Province | % ^A |
|---|----------------|
| 1A:Himalaya - Ladakh Mtns | 3.3 |
| 1B:Himalaya - Tibetan Plateau | 2.19 |
| 1C:Trans - Himalaya - Sikkim | 0.10 |
| 2A:Himalaya - North - West Himalaya | 2.1 |
| 2B:Himalaya - West Himalaya | 1.6 |
| 2C:Himalaya - Central Himalaya | 0.2 |
| 2D:Himalaya - East Himalaya | 2.5 |
| 3A:Desert - Thar | 5.4 |
| 3B:Desert - Katchchh | 1.1 |
| 4A:Semi - Arid - Punjab Plains | 3.7 |
| 4B: Semi - Arid - Gujrat Rajputana | 12.9 |
| 5A:Western Ghats - Malabar Plains | 2.0 |
| 5B: Western Ghats - Western Ghats Mtns. | 2.0 |
| 6A:Deccan Peninsula - Central Highlands | 7.3 |
| 6B: Deccan Peninsula - Chotta - Nagpur | 5.4 |
| 6C: Deccan Peninsula - Eastern Highlands | 6.3 |
| 6D: Deccan Peninsula - Central Plateau | 12.5 |
| 6E:Deccan Peninsula - Deccan South | 10.4 |
| 7A:Gangetic Plain - Upper Gangetic Plain | 6.3 |
| 7B: Gangetic Plain - Lower Gangetic Plain | 4.5 |
| 8A:Coasts - West Coast | 0.6 |
| 8B: Coasts - East Coast | 1.9 |
| 8C:Coasts - Lakshadweep | 0.1 |
| 9A: North - East - Brahmaputra Valley | 2.0 |
| 9B: North - East - North - East Hills | 3.2 |
| 10A: Islands - Andamans | 0.2 |
| 10B: Islands - Nicobars | 0.1 |
| Marine Influenced Area | 10440 sq.km |

^A Represents percentage of the total geographical area of India : 3287263 sq.km



Based up on Survey of India map with the permission of the Surveyor General of India

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The territorial waters of India extend into the sea to a distance of twelve nautical miles from the appropriate base line

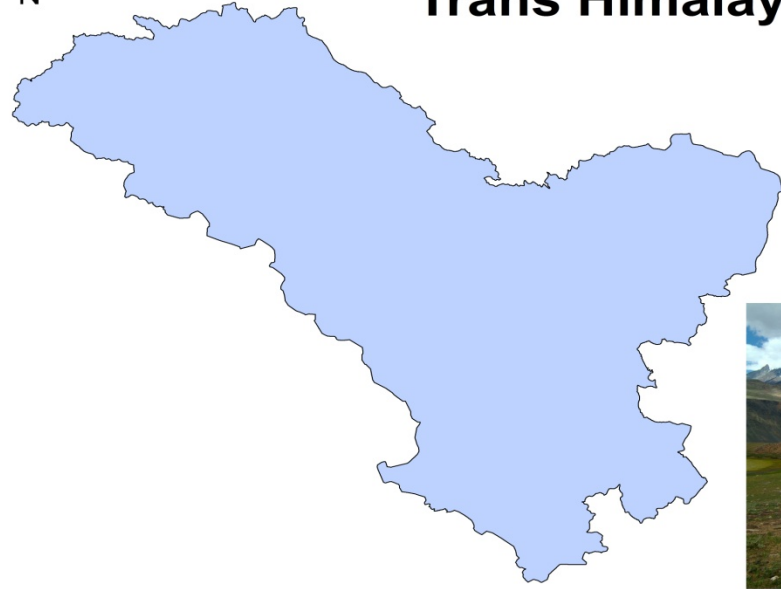
Biogeographic Zone:

Trans Himalayas



| Zone Name | Zone Area (km ²) | % of India | No. of NPs | Area (km ²) | % of Zone | No. of WLS | Area (km ²) | % of Zone | No. of NPs + WLS | Area (km ²) | % of Zone |
|----------------|------------------------------|------------|------------|-------------------------|-----------|------------|-------------------------|-----------|------------------|-------------------------|-----------|
| Trans Himalaya | 184823 | 5.62 | 3 | 5809.00 | 3.14 | 4 | 11305.56 | 6.12 | 7 | 17114.56 | 9.26 |

Biogeographic Zone Trans Himalaya



Span:
Ladakh, Jammu & Kashmir, North Sikkim
Lahaul and Spiti areas of Himachal Pradesh
Vegetation Type
Sparse Alpine Steppe Vegetation



भारतीय वन्यजीव संस्थान
Wildlife Institute of India

ENVIS-RP Wildlife and Protected Areas-2019

0 100 200 400 600 Km

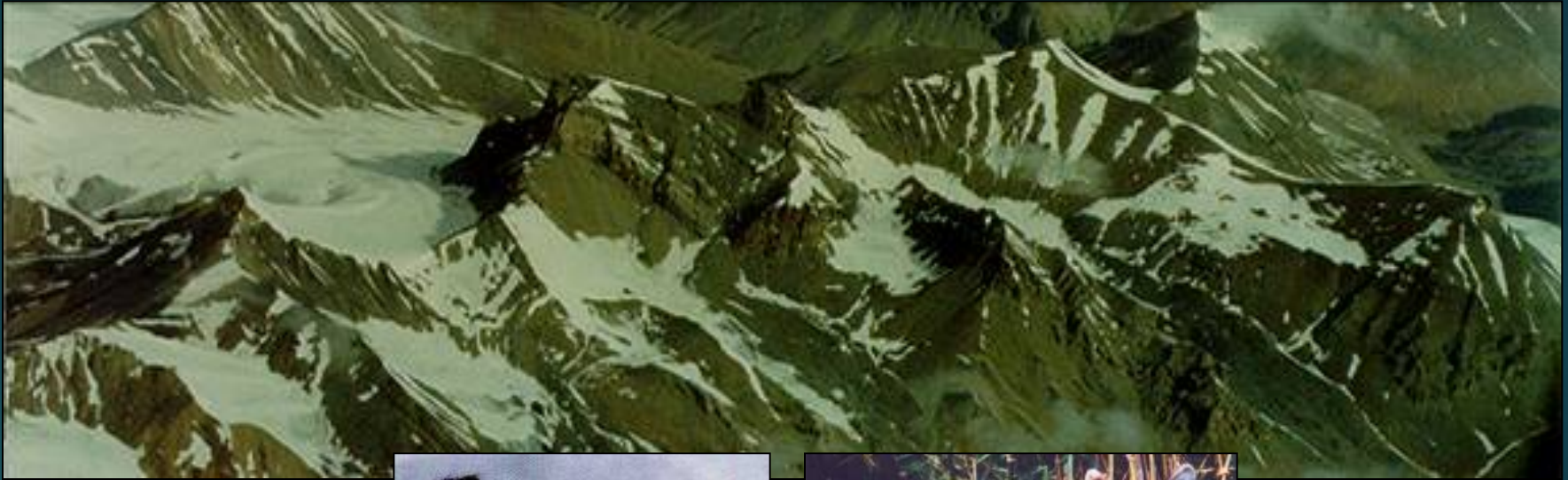


Trans Himalaya



Biogeographic Zone:

Himalayas



| Zone Name | Zone Area (km ²) | % of India | No. of NPs | Area (km ²) | % of Zone | No. of WLS | Area (km ²) | % of Zone | No. of NPs + WLS | Area (km ²) | % of Zone |
|-----------|------------------------------|------------|------------|-------------------------|-----------|------------|-------------------------|-----------|------------------|-------------------------|-----------|
| Himalaya | 210673 | 6.41 | 15 | 8203.00 | 3.89 | 65 | 16850.10 | 8.00 | 80 | 25053.10 | 11.89 |

Himalayas











Management of Large Carnivores: Snow Leopard



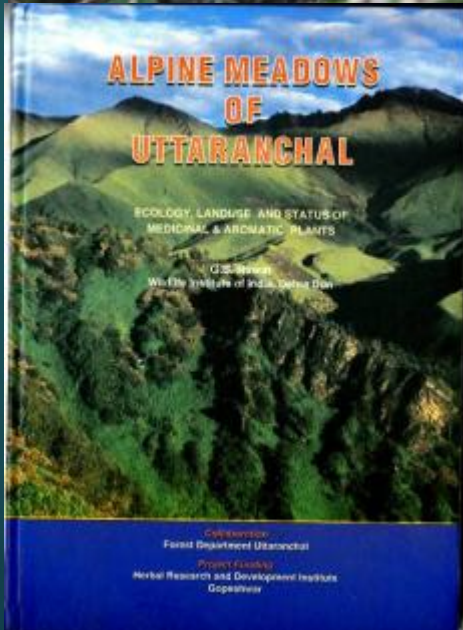
PROJECT
SNOW LEOPARD



MINISTRY OF ENVIRONMENT AND FORESTS



National Mission of Himalayan Ecosystem



Biogeographic Zone:

Desert



| Zone Name | Zone Area (km ²) | % of India | No. of NPs | Area (km ²) | % of Zone | No. of WLS | Area (km ²) | % of Zone | No. of NPs + WLS | Area (km ²) | % of Zone |
|-----------|------------------------------|------------|------------|-------------------------|-----------|------------|-------------------------|-----------|------------------|-------------------------|-----------|
| Desert | 214014 | 6.51 | 1 | 3162.00 | 1.48 | 5 | 12913.38 | 6.03 | 6 | 16075.38 | 7.51 |



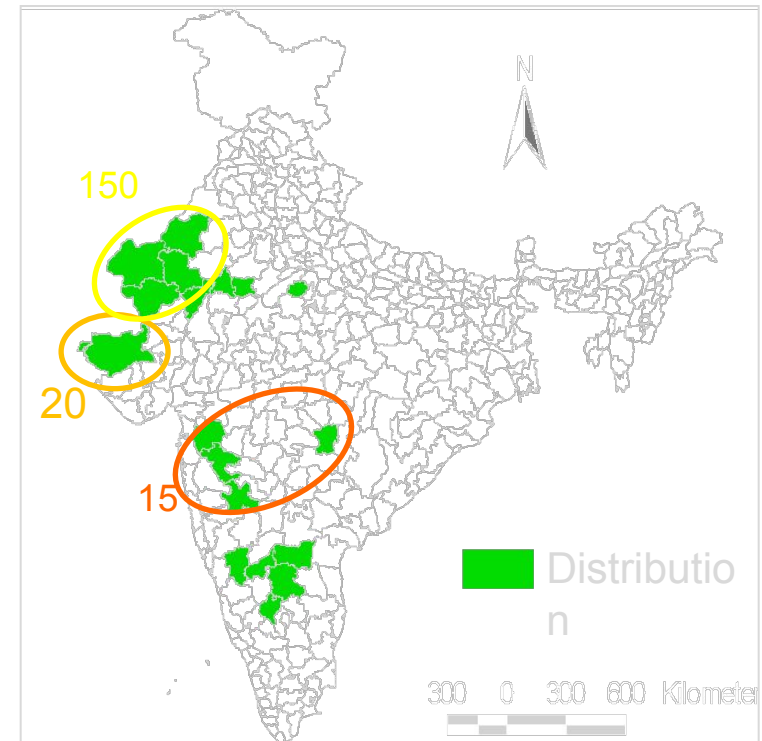
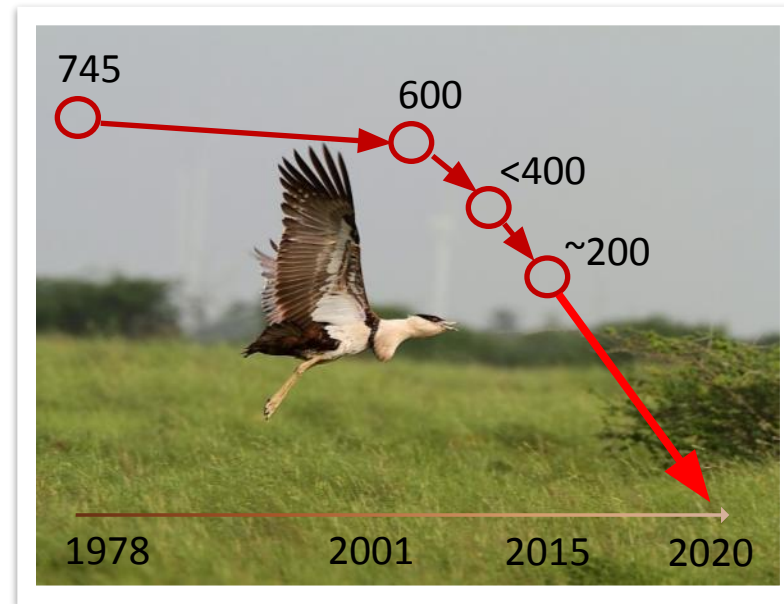


Great Indian Bustard

- Critically Endangered ~ 200 birds left
- Flagship & indicator of grasslands
- Threatened by hunting & hostile habitat
- Wide ranging nature in human-use areas; cannot be conserved only through PAs
- Needs integrated conservation approach involving research, management, protection & communities

Objectives

- Conservation Breeding Program
- Applied research
- Capacity building & awareness
- Pilot implementation of making habitat GIB friendly – Smart Green Infrastructure



Conservation Breeding Program

- Develop captive population from wild eggs/birds – artificial incubation, chick rearing & breeding
- Partnership between WII –Rajasthan and other State Governments – MoEFCC – International Bustard Breeding Facilities.
- Detailed Agreed upon action plan for the next 25-30 years



The UK great bustard *Otis tarda* reintroduction trial: a 5-year progress report

ROBERT J. BURNSIDE, IAN CARTER, ALASDAIR DAWES, DAVID WATERS
LEIGH LOCK, PAUL GORIUP and TAMÁS SZÉKELY

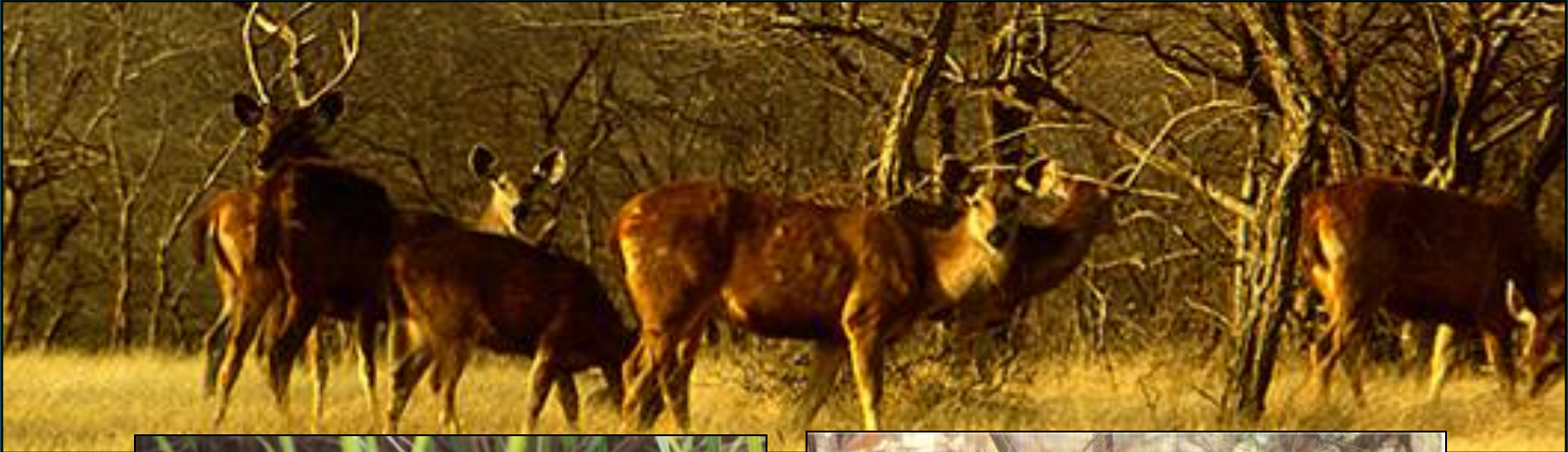
Abstract The great bustard *Otis tarda* became extinct in the UK during the 19th century due to a combination of factors, including hunting, egg collection and changes in agriculture. In 2003 a 10-year licence was granted to begin a trial to reintroduce the species back to the UK. Here we report on the first 5 years of the trial and assess the progress made towards establishing a founder population. From April 2004 to September 2009 a total of 102 great bustard chicks were imported from Russia and 86 released on Salisbury Plain. Monitoring showed that post-release survival was 10% in the first year following release, and that mortality of released bustards was mainly attributable to predation and collisions. Estimated adult survival was 7.6%, although the sample size was small. All known surviving great bustards are faithful to the surroundings of the release site, returning throughout the year. A lek has been established where males have been observed displaying to females. The first nesting attempt was in 2007, and in 2009 two females aged 3 and 4

(IUCN, 1998). However, when gaps in knowledge exist about the ecology of a species in an area from where it was extirpated, it is often difficult to determine the ability of that species to survive and persist once the original causes of extinction are removed. Consequently, trial reintroduction provides an opportunity to fill in the gaps in understanding and to assess the feasibility of a full-scale reintroduction project (Osborne, 2009).

Although the aim of a reintroduction is to establish a free-living, self-sustaining population, the progress of a reintroduction comprises a sequence of objectives, including the survival of released individuals, breeding by released individuals in the wild and then subsequent growth and persistence of the population (Seddon, 1999). Each of these stages must be assessed to identify the appropriate methodology and limitations (Seddon et al., 2007; Sutherland et al., 2010) and the importance of post-release monitoring has been increasingly emphasized in

Biogeographic Zone:

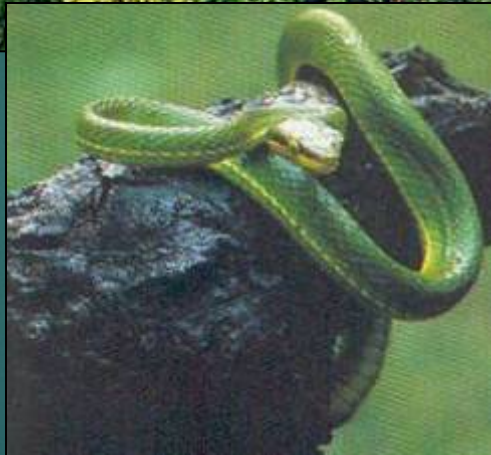
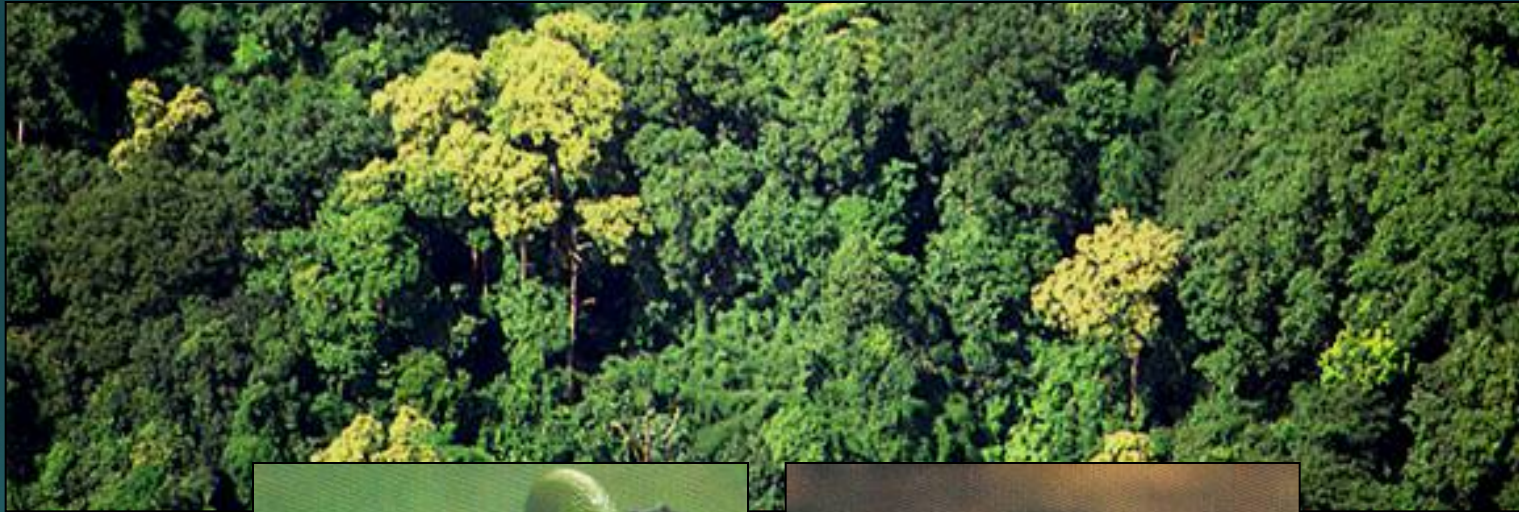
Semi-Arid



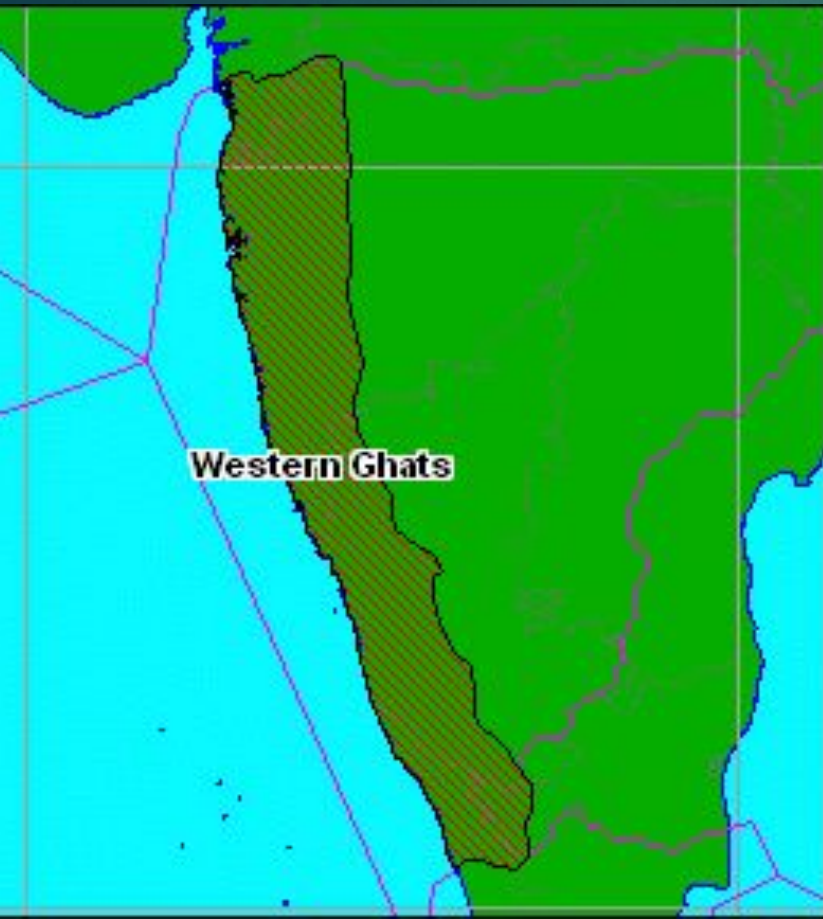
| Zone Name | Zone Area (km ²) | % of India | No. of NPs | Area (km ²) | % of Zone | No. of WLS | Area (km ²) | % of Zone | No. of NPs + WLS | Area (km ²) | % of Zone |
|-----------|------------------------------|------------|------------|-------------------------|-----------|------------|-------------------------|-----------|------------------|-------------------------|-----------|
| Semi-Arid | 539479 | 16.41 | 10 | 1505.78 | 0.28 | 81 | 12690.54 | 2.35 | 91 | 14196.32 | 2.63 |

Biogeographic Zone:

Western Ghats



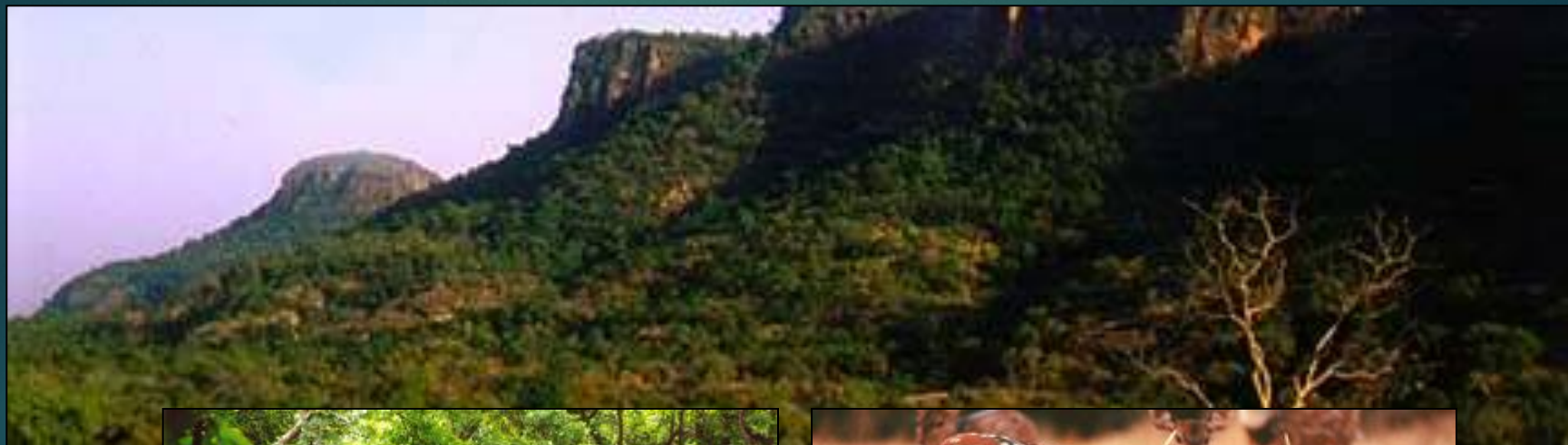
| Zone Name | Zone Area (km ²) | % of India | No. of NPs | Area (km ²) | % of Zone | No. of WLS | Area (km ²) | % of Zone | No. of NPs + WLS | Area (km ²) | % of Zone |
|---------------|------------------------------|------------|------------|-------------------------|-----------|------------|-------------------------|-----------|------------------|-------------------------|-----------|
| Western Ghats | 132179 | 4.02 | 16 | 3673.52 | 2.78 | 50 | 10419.67 | 7.88 | 66 | 14093.19 | 10.66 |





Biogeographic Zone:

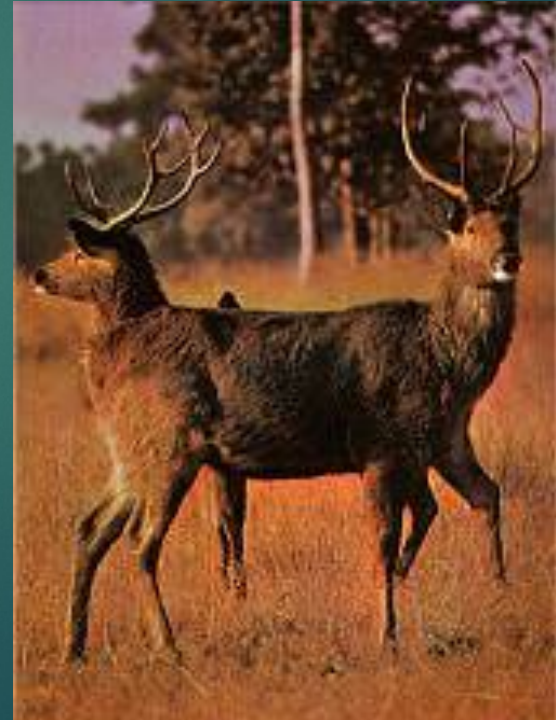
Deccan Peninsula



| Zone Name | Zone Area (km ²) | % of India | No. of NPs | Area (km ²) | % of Zone | No. of WLS | Area (km ²) | % of Zone | No. of NPs + WLS | Area (km ²) | % of Zone |
|------------------|------------------------------|------------|------------|-------------------------|-----------|------------|-------------------------|-----------|------------------|-------------------------|-----------|
| Deccan Peninsula | 1380339 | 41.99 | 24 | 9798.91 | 0.71 | 130 | 46230.45 | 3.35 | 151 | 56029.36 | 4.06 |



Central Highlands, Eastern Ghats



Biogeographic Zone:

Gangetic Plains



| Zone Name | Zone Area (km ²) | % of India | No. of NPs | Area (km ²) | % of Zone | No. of WLS | Area (km ²) | % of Zone | No. of NPs + WLS | Area (km ²) | % of Zone |
|----------------|------------------------------|------------|------------|-------------------------|-----------|------------|-------------------------|-----------|------------------|-------------------------|-----------|
| Gangetic Plain | 354848 | 10.79 | 6 | 2363.44 | 0.67 | 32 | 5372.05 | 1.51 | 38 | 7735.49 | 2.18 |

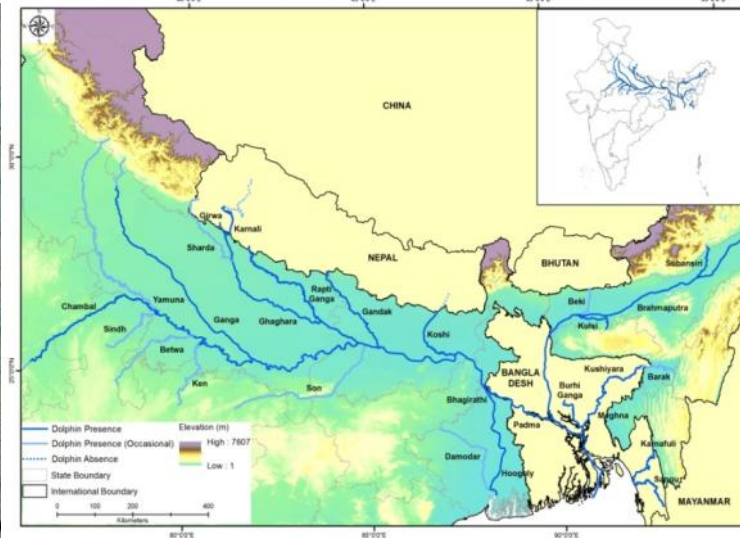
Gangetic Dolphin



| | | | | | | | | |
|---------------|----------------|---------------|-----------------|------------|---------------------------|-----------------------|---------------------|---------|
| NOT EVALUATED | DATA DEFICIENT | LEAST CONCERN | NEAR THREATENED | VULNERABLE | <ENDANGERED> | CRITICALLY ENDANGERED | EXTINCT IN THE WILD | EXTINCT |
| NE | DD | LC | NT | VU | EN | CR | EW | EX |



© Mansur/BCDP



- ◆ A blind dolphin in one of the world's most populated areas
- ◆ Less than 2000 individuals and continuously declining
- ◆ Endangered and protected by the Government of India
- ◆ Threatened due to dams and barrages, poaching and pollution
- ◆ Identification of more critical of habitats of dolphin and prepare management plan for the same
- ◆ Awareness programme to protect the species from fisheries and pollution

Gharials: No place to go



Biogeographic Zone:

Coasts



| Zone Name | Zone Area (km ²) | % of India | No. of NPs | Area (km ²) | % of Zone | No. of WLS | Area (km ²) | % of Zone | No. of NPs + WLS | Area (km ²) | % of Zone |
|-----------|------------------------------|------------|------------|-------------------------|-----------|------------|-------------------------|-----------|------------------|-------------------------|-----------|
| Coasts | 91319 | 2.78 | 5 | 1731.18 | 1.90 | 20 | 2959.43 | 3.24 | 25 | 4690.61 | 5.14 |



Sea turtles



Whale Sharks





Sea cow

Biogeographic Zone:

North East



| Zone Name | Zone Area (km ²) | % of India | No. of NPs | Area (km ²) | % of Zone | No. of WLS | Area (km ²) | % of Zone | No. of NPs + WLS | Area (km ²) | % of Zone |
|------------|------------------------------|------------|------------|-------------------------|-----------|------------|-------------------------|-----------|------------------|-------------------------|-----------|
| North East | 171340 | 5.21 | 13 | 2674.00 | 1.56 | 37 | 3736.76 | 2.18 | 50 | 6410.76 | 3.74 |

North Eastern India

North-East India







Sangai *Rucervus eldii eldii*

- Single, isolated and small population ~100
- Found only in Keibul Lamjao NP, Manipur
- Endangered (IUCN), Schedule-I species (WPA)
- Globally threatened
- Highly inbred, low genetic diversity



Biogeographic Zone:

Islands



| Zone Name | Zone Area (km ²) | % of India | No. of NPs | Area (km ²) | % of Zone | No. of WLS | Area (km ²) | % of Zone | No. of NPs + WLS | Area (km ²) | % of Zone |
|-----------|------------------------------|------------|------------|-------------------------|-----------|------------|-------------------------|-----------|------------------|-------------------------|-----------|
| Island | 8249 | 0.25 | 9 | 1153.94 | 13.99 | 96 | 389.39 | 4.72 | 105 | 1546.30 | 18.75 |





Key Challenges for Wildlife Conservation

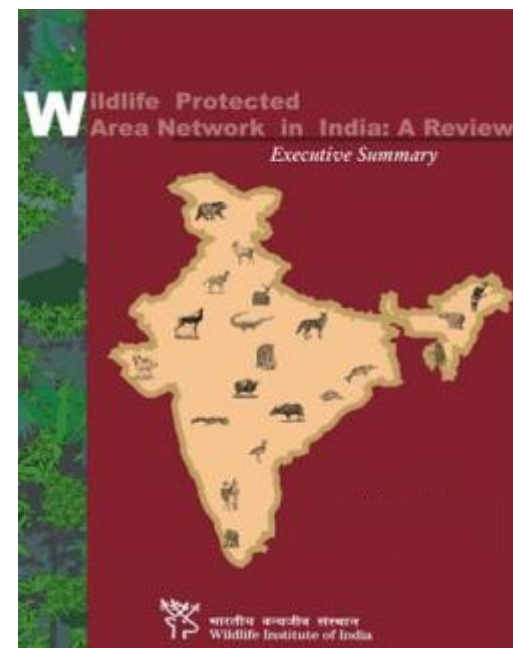
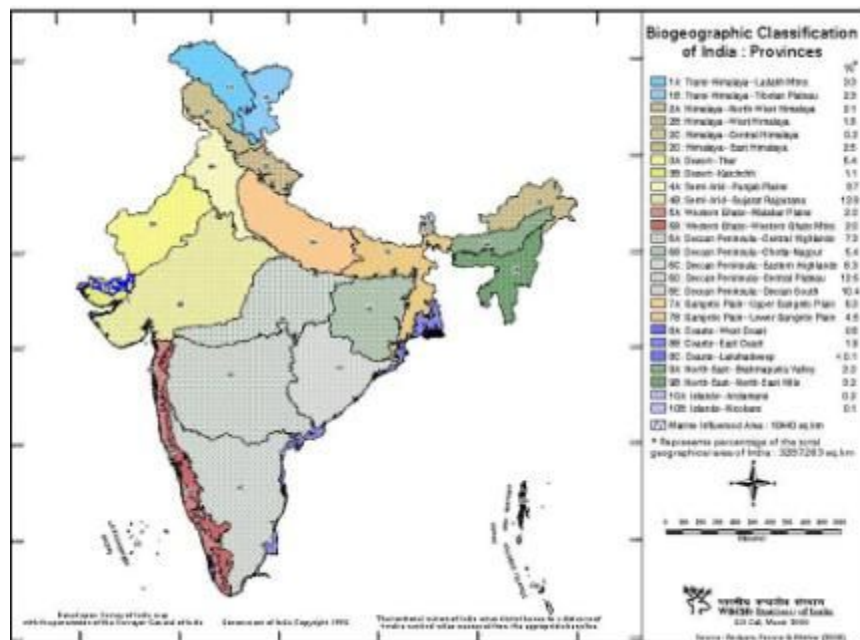
4 *At a glance...*

- ◆ Mitigation of Human-wildlife conflicts.
- ◆ Delineation of Eco-Sensitive Zones (ESZs).
- ◆ Management of Invasive Alien Species.
- ◆ Mainstreaming of wildlife conservation in development planning.



more...

Ecological Gap Analysis...



| Category | 1988 | | | 2020 (Jan, 2020) | | |
|------------------------|------------|-------------------------|-------------|------------------|-------------------------|-------------|
| | Nos. | Area (km ²) | % | Nos. | Area (km ²) | % |
| National Parks | 54 | 21,003 | 0.64 | 101 | 40,564.04 | 1.23 |
| Wildlife Sanctuaries | 372 | 88,649 | 2.70 | 553 | 119,757.00 | 3.62 |
| Community Reserve | - | - | - | 163 | 833.34 | 0.02 |
| Conservation Reserve | - | - | - | 86 | 3,878.25 | 0.13 |
| Protected Areas | 426 | 109,652 | 3.34 | 903 | 165,032.62 | 5.01 |

DISTRIBUTION BY BIOGEOGRAPHIC ZONES

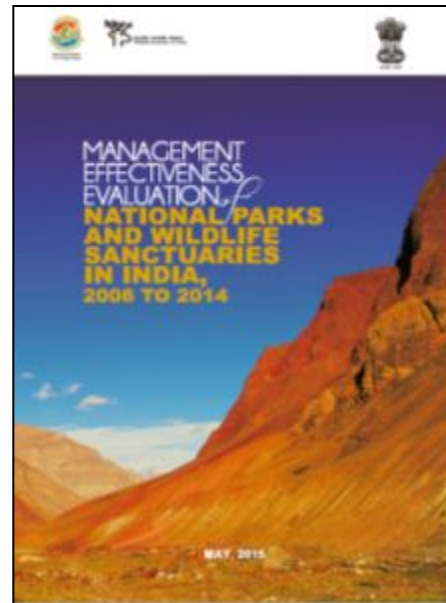
The existing distribution of NPs and PAs by Zones is as follows

| Zone | Name | % as NPs | % as PAs |
|------|------------------|----------|----------|
| 1. | Trans-Himalaya | 3.55 | 9.20 |
| 2. | Himalayas | 3.58 | 9.94 |
| 3. | Desert | 1.48 | 7.51 |
| 4. | Semi-Arid | 0.25 | 2.65 |
| 5. | Western Ghats | 2.52 | 9.48 |
| 6. | Deccan | 0.62 | 3.69 |
| 7. | Gangetic Plain | 0.67 | 2.16 |
| 8. | Coasts | 1.90 | 6.15 |
| 9. | North-East India | 1.13 | 2.54 |
| 10. | Islands | 10.92 | 15.43 |

Management Effectiveness Evaluation of PAs (2018-2020)

How secure are Protected Areas...?

| Total No. of Protected Areas Evaluated | Overall MEE Score (%) | Evaluation Category | | | |
|--|-----------------------|---------------------|----------|--------------|----------|
| | | Very Good | Good | Satisfactory | Poor |
| 125 | 61 (Good) | 18 (14%) | 42 (34%) | 62 (50%) | 03 (02%) |
| | | | | | |



Nature Nurtures... Conserve Nature

Together we can build a frame work that
nourishes and not depletes our natural assets...

Thank You !
