

Biodiversity Loss and Impacts



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Webinar on Habitat Destruction, Biodiversity Loss and Disease Outbreak
Gujarat Institute of Disaster Management (GIDM)
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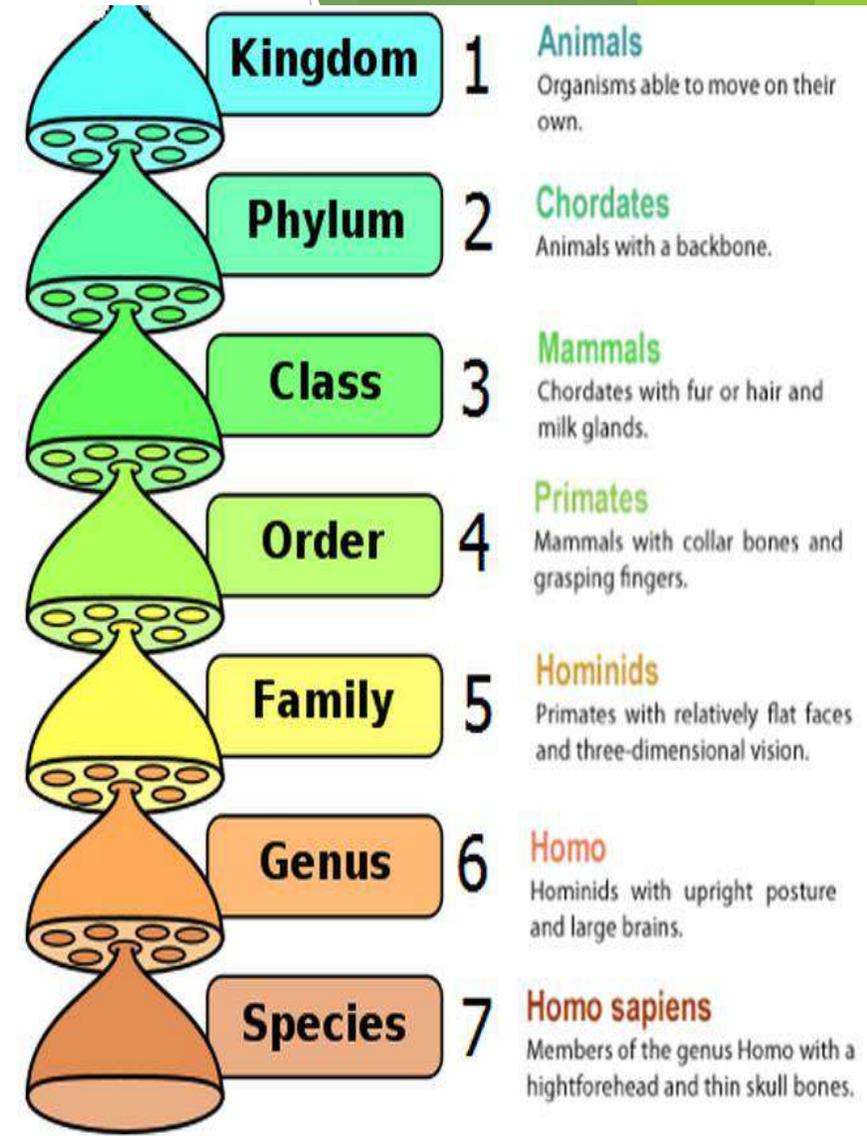
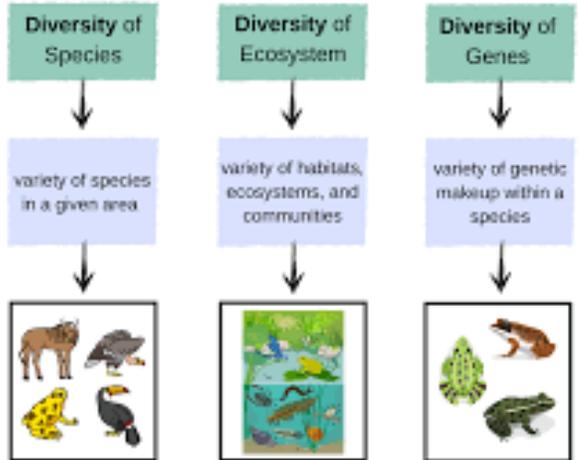
Overview

- ▶ Understanding Biodiversity
- ▶ India's Biodiversity Richness
- ▶ Causes of Biodiversity Loss (with examples of Gujarat)
- ▶ Earth's Mass Extinctions and Natural Calamities
- ▶ Impacts of Biodiversity loss
- ▶ Risks and Assessment
- ▶ Policies in Action
- ▶ Relation between Biodiversity and Disease Outbreak

Understanding Biodiversity

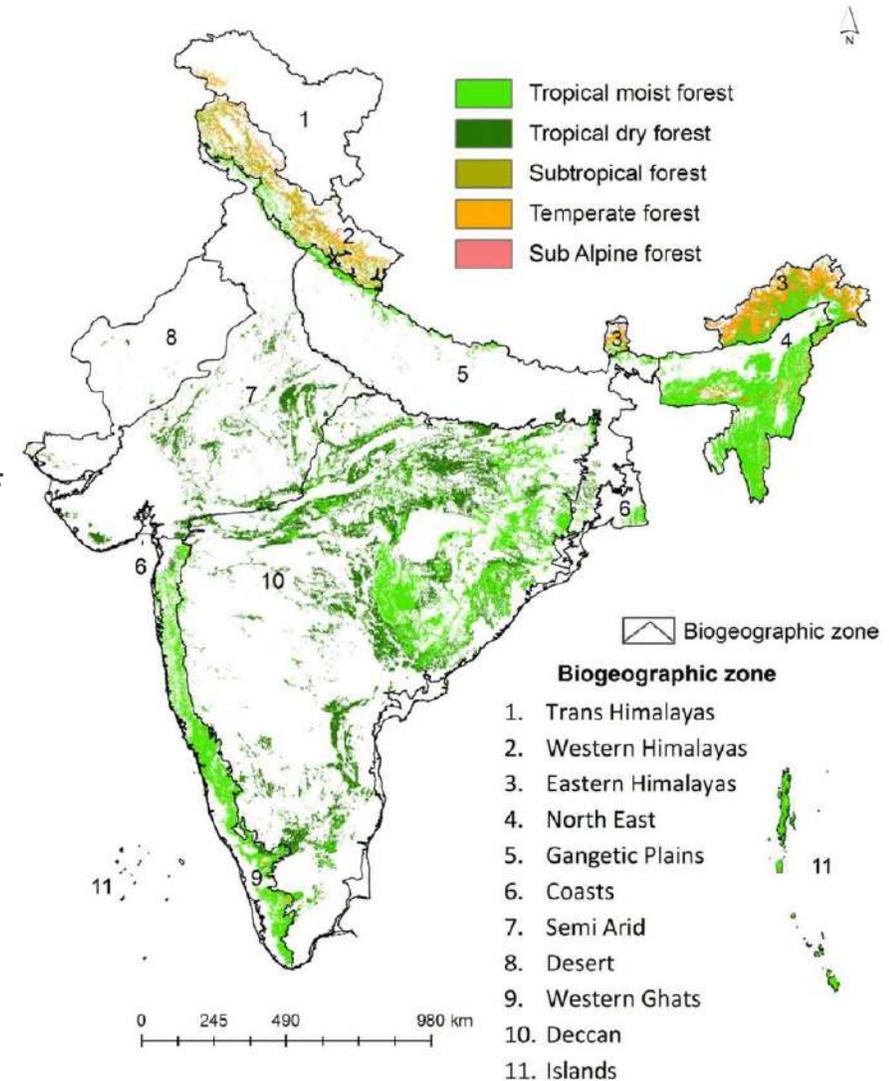
- ▶ Biological Diversity - variability among living organisms from all domains of earth
- ▶ Three types - Genetic, Species and Ecological Diversity
- ▶ The Biodiversity we see today -
 - ▶ Result of millions of years of evolution (3.5 billion years),
 - ▶ shaped by natural processes;
 - ▶ and off-late, increasingly by influences of humans
- ▶ Provides large number of goods and services that sustain human life

3 TYPES OF BIODIVERSITY



India's Biodiversity

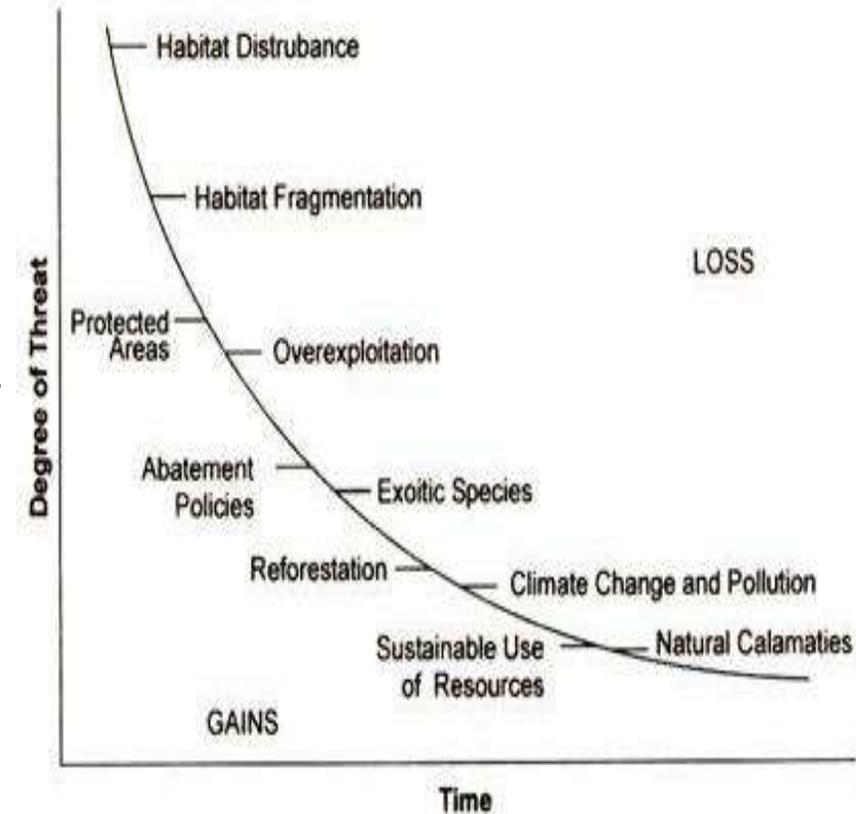
- ▶ One of the 17 Mega-Biodiverse Countries in the world; 4 of the 34 biodiversity hotspots in the world.
- ▶ 2.4% of geographical area - 7-8% of recorded species in the world
- ▶ India accounts for 11.4% of the recorded plant species on earth, 6% of world's flowering plants (angiosperms) (45,000 spp of plants as per FAO,2014)
- ▶ It is home to 7.6% mammalians, 12.6% of avian, 6.2% of reptilian, 4.4% of amphibian, and 11.7% of ichthyofauna (fish) (91,000 spp of animals as per FAO, 2014).
- ▶ Has rich traditional crop varieties - 7th largest contribution to agricultural species, particularly - grains, fruits and vegetables
- ▶ It has 11 distinct bio-geographic zones and 15 major agro-climatic zones
- ▶ Dedicated 92 National Parks and 500 Wildlife Sanctuaries (15.67 m ha area, 4.6% of land mass)



Causes of Biodiversity loss and classic examples from Gujarat

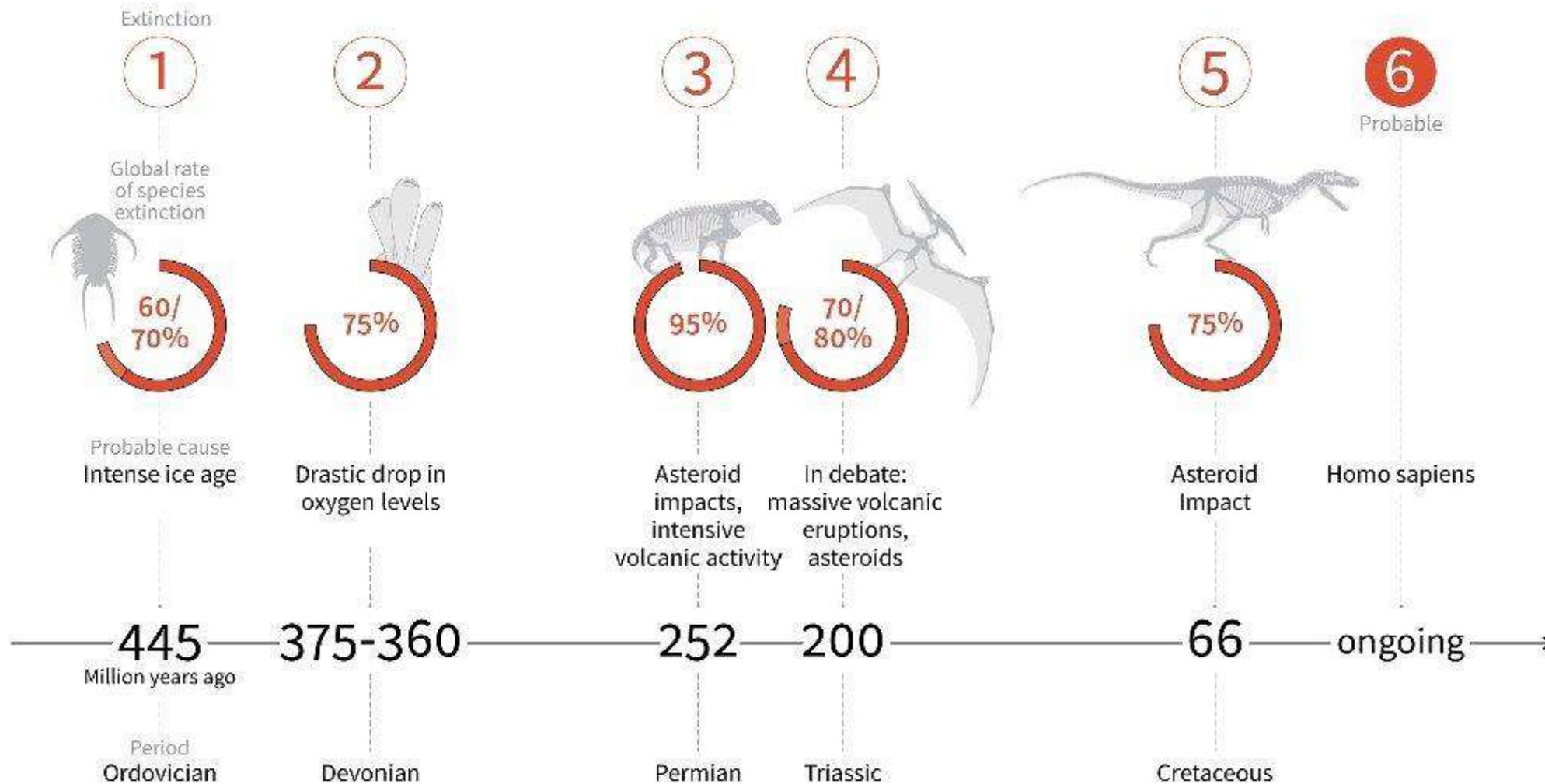
1. Habitat Disturbance (roads, power lines, rails, soil works etc.) - **GIB in Naliya, Kachchh**
 2. Fragmentation and outright loss of ecosystems (forests, wetlands, coral reefs, and other ecosystems) - **Fragmentation of Gir and Girnar**
 3. Over use and over-exploitation of resources - **Girnar during Kathiyaras**
 4. Domestication and culture of limited varieties of animals and plants - **Crossbreeds replacing indigenous cattle species (Gir, Kankaraj)**
 5. Commercial plantations of single or limited spp of plants/ trees (Monoculture) - **Eucalyptus plantations**
 6. Encroachment of exotic species - **Banni grassland**
 7. Climate change and pollution (slow and long term change) - species shifts and migrations, forced adaptation - dwindling populations of sensitive species - **CORALS in GoK**
 8. Natural calamities (floods, earthquakes, storms, volcanic eruptions etc.)
- **We are going through 6th Mass Extinction (Anthropocene Extinction)**

Factors Influencing Biodiversity: Loss and Gains



Earth's "mass extinctions"

During the last 500 million years, Earth has experienced five periods when at least half the living creatures were wiped out



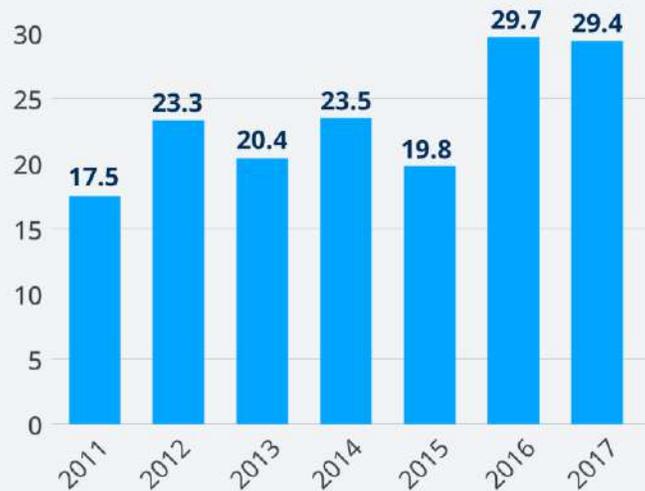
Sources: National Geographic, Encyclopedia Britannica, scientific studies

Forest Cover Loss

45 per cent of the Earth's natural forests are gone, cleared mostly during the past century (CBD, 2020)

Forest loss in 2017 was the second-highest on record

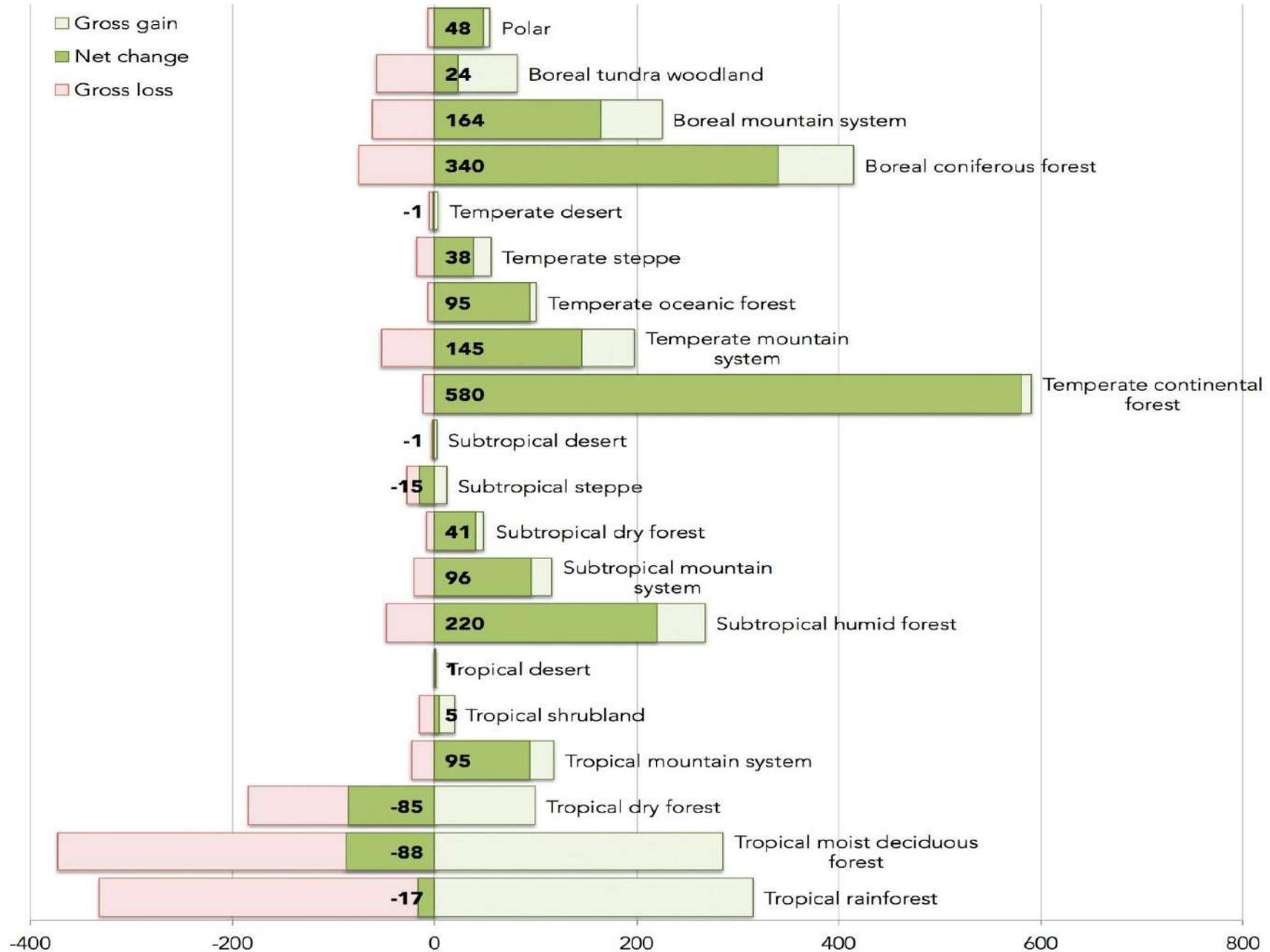
Tree cover loss in million hectares



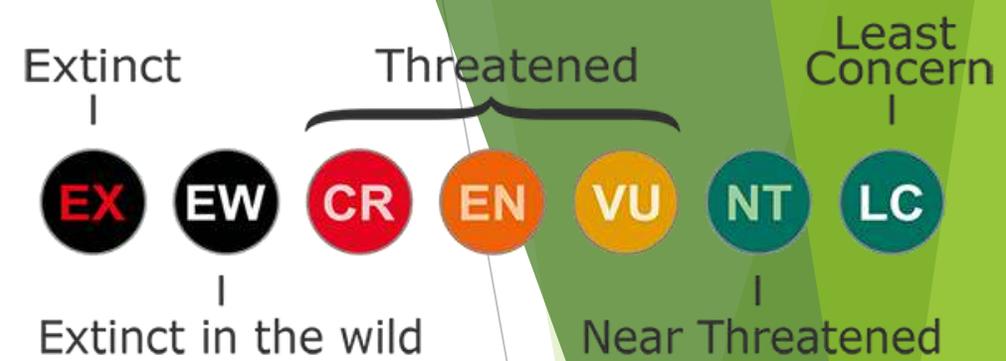
Source: Global Forest Watch

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Tree canopy cover loss/gain 1982-2016 (1000 sq km)



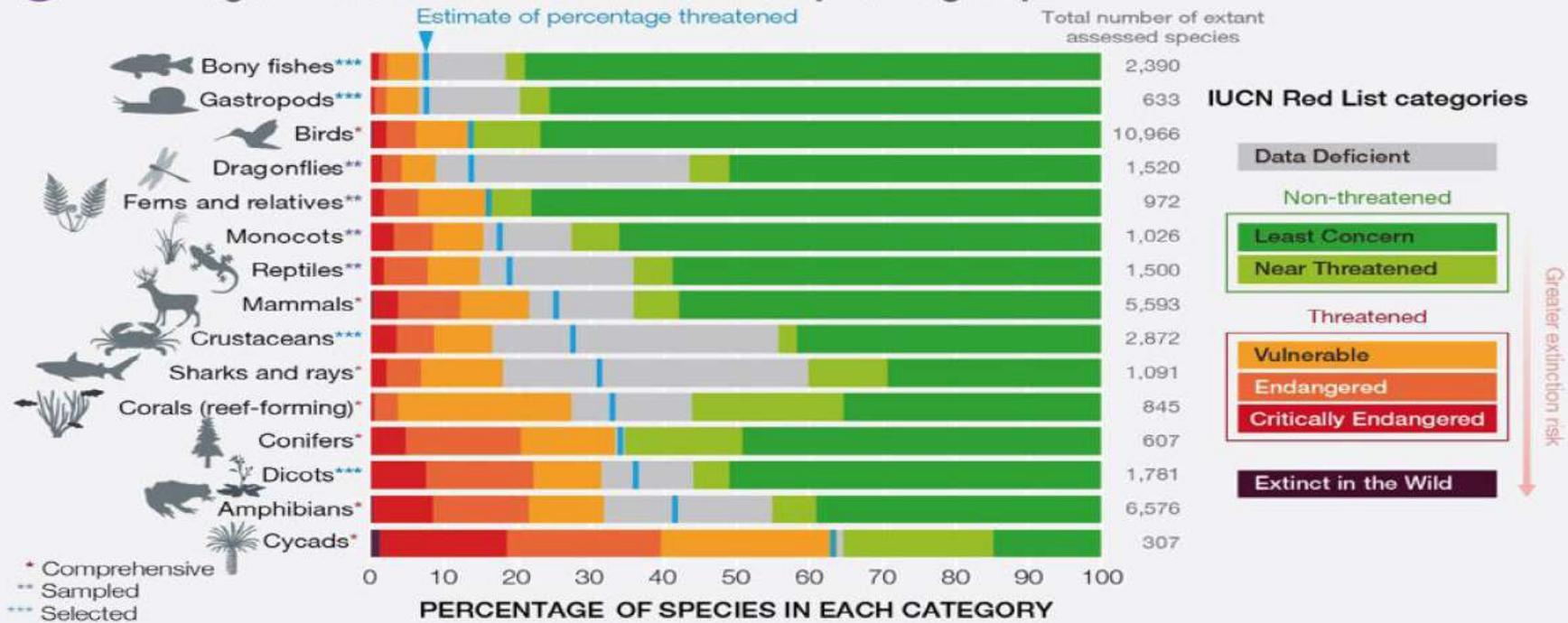
Biodiversity loss - a glimpse



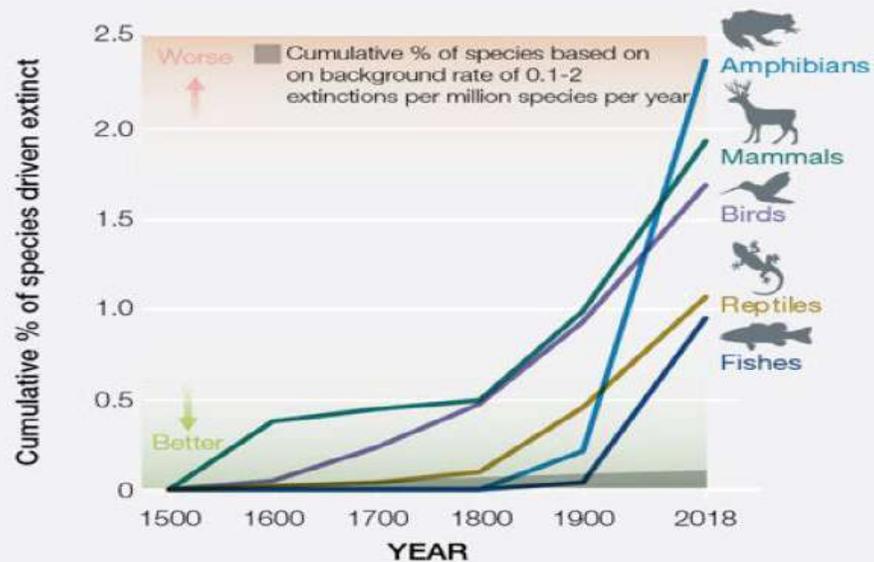
- ▶ Declines in the numbers of such charismatic animals as pandas, tigers, elephants, rhinos, lions, whales, and various species of birds - from past 100 years
- ▶ Species have been disappearing at 50-100 times than the natural rate, which is predicted to rise dramatically (CBD)
- ▶ Based on current trends, an estimated 34,000 plant and 5,200 animal species face extinction (CBD)
- ▶ 45% of natural forests, 10% of coral reef diversity and 50% of mangrove habitats have already gone!
- ▶ The threat to biodiversity - is the threat to us, not just to other creatures facing extinction!!
- ▶ GLOBAL CLIMATE CHANGE IS ADDING TO THE STRESS - SLOW AND ERRATIC

Source: IBBES Global Assessment

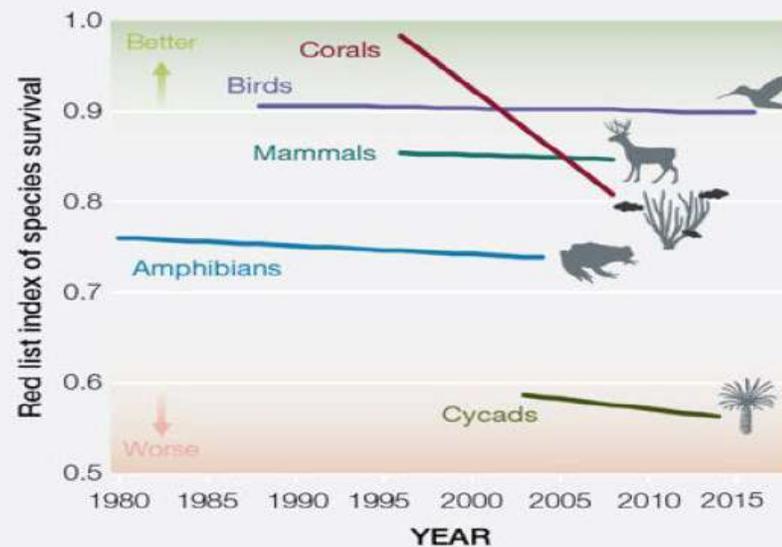
A Current global extinction risk in different species groups



B Extinctions since 1500



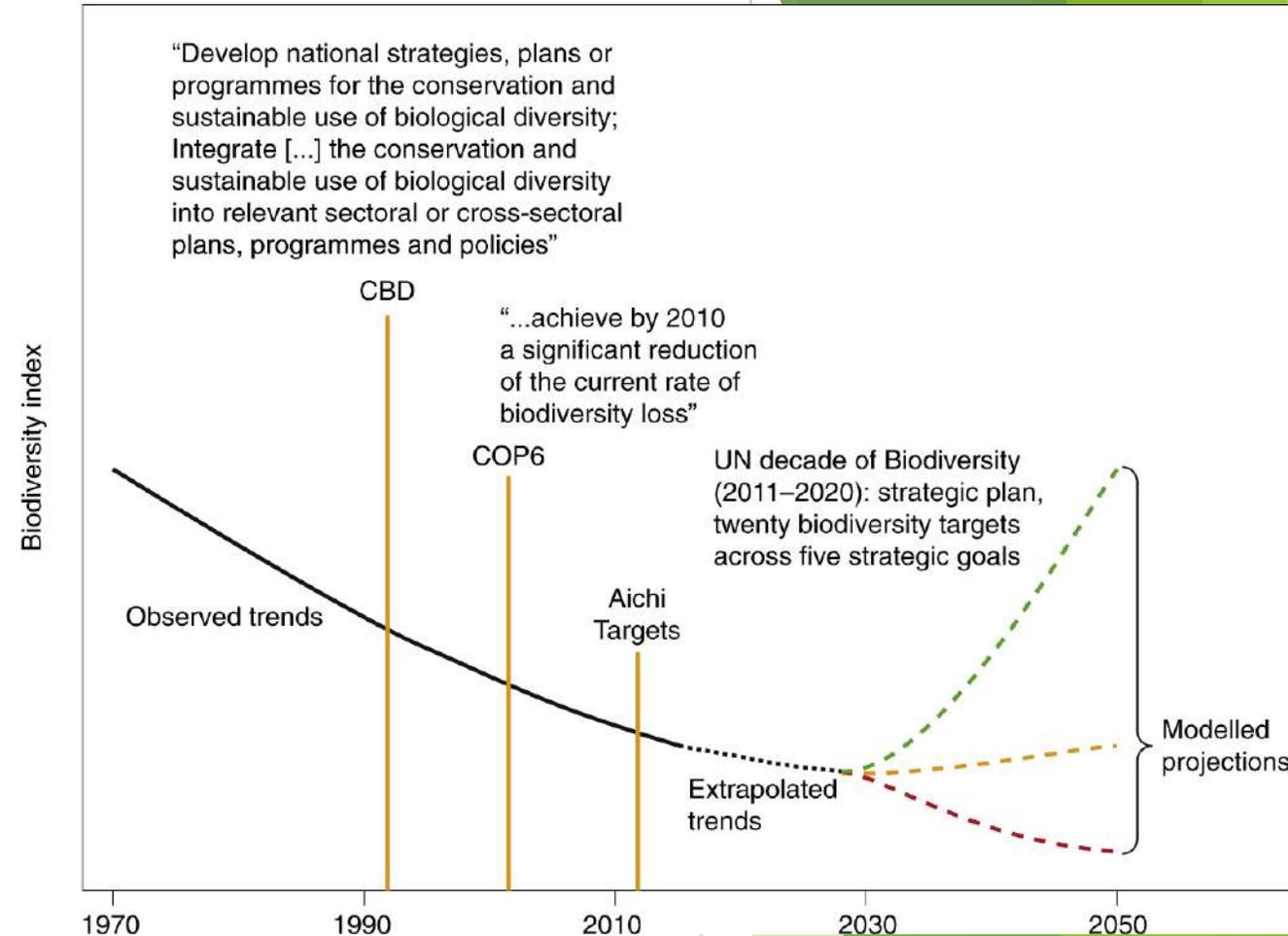
C Declines in species survival since 1980 (Red List Index)



Source: IPBES Global Assessment

Impacts of Biodiversity loss

- ▶ Loss of biodiversity threatens
 - ▶ food supplies
 - ▶ sources of wood and NTFPs
 - ▶ medicines
 - ▶ energy
 - ▶ opportunities for recreation, tourism and cultural beliefs
- ▶ Interfering with essential ecological functions - carbon, oxygen and water cycles, soil nutrition, waste assimilation
- ▶ Destabilizes ecosystems (DYNAMIC EQUILIBRIUM)
 - ▶ weakens their ability to deal with natural disasters such as floods, droughts, and hurricanes and with human-caused stresses, such as pollution and climate change
 - ▶ REDUCES RESILIENCE of Ecosystems
 - ▶ Triggers further biodiversity loss



Policies in action



Convention on Biological Diversity



- ▶ Convention on Biological Diversity (1993)
 - ▶ The conservation of biological diversity
 - ▶ The sustainable use of the components of biological diversity
 - ▶ The fair and equitable sharing of the benefits
 - ▶ National biodiversity targets allocated
 - ▶ 193 countries are signatory to CBD and implementing its measures
- ▶ Biodiversity Act of India (2002)
 - ▶ Enacted to regulate access to, and use of, its biological resources
 - ▶ Statutory autonomous bodies at national and state level (NBA and SBB)
 - ▶ Role of local governance - BMC and PBR
 - ▶ India's National BD Action Plan



Biodiversity Loss and Disease Outbreak

- ▶ *A section of scientists say there is a 'biodiversity dilution effect' in which declining biodiversity results in increased infectious-disease transmission.*
- ▶ *Scientists have observed link between decrease in disease frequency with increase in host diversity.*
- ▶ *Incidence of West Nile Disease and Lyme Disease has been linked to the biodiversity dilution effect.*
- ▶ **Kyasanur forest disease (KFD)** is a tick-borne viral haemorrhagic fever endemic to South-western part of **India**.
- ▶ *However, another section of scientists say the issue of biodiversity dilution effect is the subject of ongoing research and is still unresolved.*

- ▶ *Source: <https://india.mongabay.com/2020/04/can-biodiversity-loss-lead-to-more-infectious-disease-spread/>*

- ▶ Clear links between biodiversity losses and increased risk of transmission (research of SRM University, Chennai of 2018) - biodiversity has great influence on magnitude and impact of epidemics
- ▶ An article in Journal of Community Medicine attributed an outbreak of anthrax in Chhattisgarh state to the loss of biodiversity.
- ▶ Species at risk of extinction can directly impact human health
- ▶ In the case of **disease transmission dynamics**, species evenness is important as it indicates the total distribution of vectors available for a pathogen to feed from, he says.
- ▶ Examples of diseases that entered humans as host directly from wild or from domesticated animals (who caught it from wild) - plague, anthrax, SERS, MERS, Zika, Ebola and Noval Coronavirus - that became an epidemic
 - ▶ **Reasons - mishandling of ecosystems, deforestation**

Stories from India

- ▶ **Kyasanur Forest Disease - Western Ghats**
 - ▶ Forest Officers and wood collectors contract this disease when they go into the forest
 - ▶ From monkeys - ticks - causes brain haemorrhage and is fatal
 - ▶ ATREE is mapping and studying this for last 30 years

Thank You