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Red Data Book – An Inventory of the Global Conservation Status of Biological Species

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ABSTRACT: The International Union for Conservation of Nature (IUCN) **Red List of Threatened Species**, also known as the **IUCN Red List** or **Red Data Book**, founded in 1964, is the world's most comprehensive inventory of the global conservation status of biological species.[1] It uses a set of precise criteria to evaluate the extinction risk of thousands of species and subspecies. These criteria are relevant to all species and all regions of the world. With its strong scientific base, the IUCN Red List is recognized as the most authoritative guide to the status of biological diversity. A series of Regional Red Lists are produced by countries or organizations, which assess the risk of extinction to species within a political management unit.

The aim of the IUCN Red List is to convey the urgency of conservation issues to the public and policy makers, as well as help the international community to reduce species extinction. According to IUCN the formally stated goals of the Red List are to provide scientifically based information on the status of species and subspecies at a global level, to draw attention to the magnitude and importance of threatened biodiversity, to influence national and international policy and decision-making, and to provide information to guide actions to conserve biological diversity.[2]
Major species assessors include BirdLife International, the Institute of Zoology (the research division of the Zoological Society of London), the World Conservation Monitoring Centre, and many Specialist Groups within the IUCN Species Survival Commission (SSC). Collectively, assessments by these organizations and groups account for nearly half the species on the Red List.

The IUCN aims to have the category of every species re-evaluated at least every ten years, or every five years if possible. This is done in a peer reviewed manner through IUCN Species Survival Commission Specialist Groups, which are Red List Authorities responsible for a species, group of species or specific geographic area, or in the case of BirdLife International, an entire class (Aves).[3]
The number of species which have been assessed for the Red List has been increasing over time.[4] As of 2019, of 105,000 species surveyed, 28,338 are considered at risk of extinction because of human activity, in particular overfishing, hunting, and land development.[5]

I.INTRODUCTION

1964 Red List of Threatened Plants
The 1964 IUCN Red List of Threatened Plants used the older pre-criteria Red List assessment system. Plants listed may not, therefore, appear in the current Red List. IUCN advise that it is best to check both the online Red List and the 1997 plants Red List publication.[6]

2006 release
The 2006 Red List, released on 4 May 2006 evaluated 40,168 species as a whole, plus an additional 2,160 subspecies, varieties, aquatic stocks, and subpopulations.

2007 release
On 12 September 2007, the World Conservation Union (IUCN) released the **2007 IUCN Red List of Threatened Species**. In this release, they have raised their classification of both the western lowland gorilla (*Gorilla gorilla gorilla*) and the Cross River gorilla (*Gorilla gorilla diehli*) from endangered to critically endangered, which is the last category before extinct in the wild, due to Ebola virus and poaching, along with other factors. Russ Mittermeier, chief of Swiss-based IUCN's Primate Specialist Group, stated that 16,306 species are endangered with extinction, 188 more than in 2006 (total of 41,415 species on the Red List). The Red List includes the Sumatran orangutan (*Pongo abelii*) in the Critically Endangered category and the Bornean orangutan (*Pongo pygmaeus*) in the Endangered category.[7]

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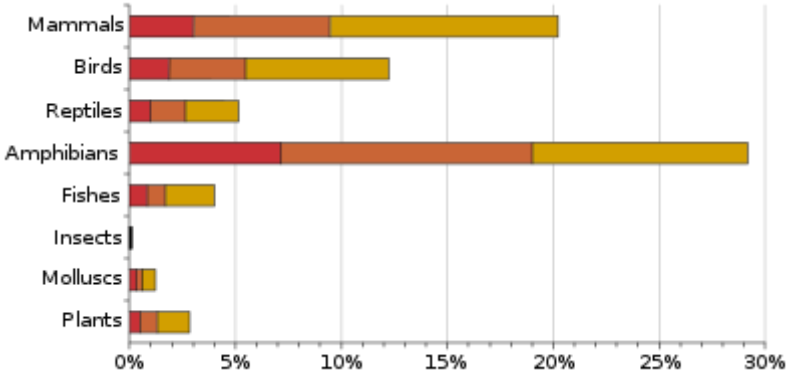
2008 release

The 2008 Red List was released on 6 October 2008 at the IUCN World Conservation Congress in Barcelona and "confirmed an extinction crisis, with almost one in four [mammals] at risk of disappearing forever". The study shows at least 1,141 of the 5,487 mammals on Earth are known to be threatened with extinction, and 836 are listed as Data Deficient.[8]

2012 release

The Red List of 2012 was released 19 July 2012 at Rio+20 Earth Summit;[9] nearly 2,000 species were added,[10] with 4 species to the extinct list, 2 to the rediscovered list.[11] The IUCN assessed a total of 63,837 species which revealed 19,817 are threatened with extinction.[12] 3,947 were described as "critically endangered" and 5,766 as "endangered", while more than 10,000 species are listed as "vulnerable".[13] At threat are 41% of amphibian species, 33% of reef-building corals, 30% of conifers, 25% of mammals, and 13% of birds.[12] The IUCN Red List has listed 132 species of plants and animals from India as "Critically Endangered".[14]



The percentage of species in several groups which are listed as critically endangered, endangered, or vulnerable on the 2007 IUCN Red List.

II.DISCUSSION

Species are classified by the IUCN Red List into nine groups,[15] specified through criteria such as rate of decline, population size, area of geographic distribution, and degree of population and distribution fragmentation.[16] There is an emphasis on the acceptability of applying any criteria in the absence of high quality data including suspicion and potential future threats, "so long as these can reasonably be supported".:6[17]

- Extinct (EX) – beyond reasonable doubt that the species is no longer extant.
- Extinct in the wild (EW) – survives only in captivity, cultivation and/or outside native range, as presumed after exhaustive surveys.
- Critically endangered (CR) – in a particularly and extremely critical state.
- Endangered (EN) – very high risk of extinction in the wild, meets any of criteria A to E for Endangered.
- Vulnerable (VU) – meets one of the 5 Red List criteria and thus considered to be at high risk of unnatural (human-caused) extinction without further human intervention.
- Near threatened (NT) – close to being endangered in the near future.
- Least concern (LC) – unlikely to become endangered or extinct in the near future.
- Data deficient (DD)
- Not evaluated (NE)

In the IUCN Red List, "threatened" embraces the categories of Critically Endangered, Endangered, and Vulnerable.[18]

1994 categories and 2001 framework

The older 1994 list has only a single "Lower Risk" category which contained three subcategories:

- Conservation Dependent (LR/cd)
- Near Threatened (LR/nt)
- Least Concern (LR/lc)

In the 2001 framework, *Near Threatened* and *Least Concern* became their own categories, while *Conservation Dependent* was removed and its contents merged into *Near Threatened*.

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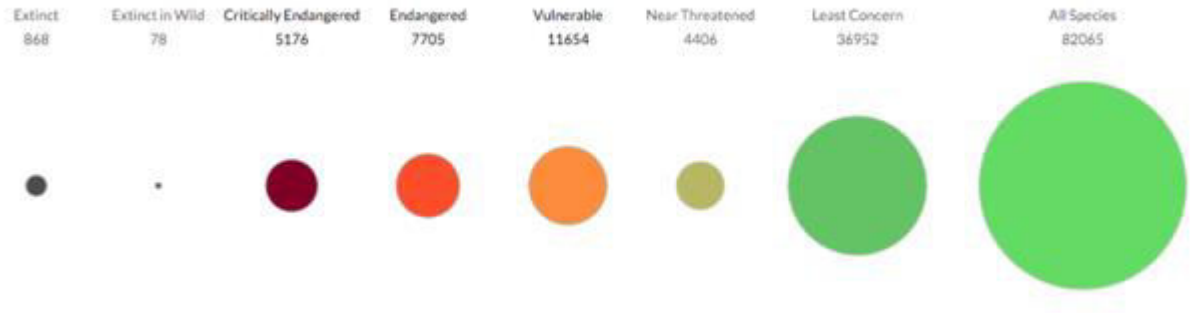
Possibly extinct

The tag of "possibly extinct" (PE)[19] is used by Birdlife International, the Red List Authority for birds for the IUCN Red List.[20] BirdLife International has recommended PE become an official tag for Critically Endangered species, and this has now been adopted, along with a "Possibly Extinct in the Wild" tag for species with populations surviving in captivity but likely to be extinct in the wild.

There have been a number of versions, dating from 1991, including:[21][22]

- Version 1.0 (1991)
- Version 2.0 (1992)
- Version 2.1 (1993)
- Version 2.2 (1994)
- Version 2.3 (1994)
- Version 3.0 (1999)
- Version 3.1 (2001)

All new IUCN assessments since 2001 have used version 3.1 of the categories and criteria.



Comparing the number of species in each category of IUCN Red List

III.RESULTS

In 1997, the IUCN Red List received criticism on the grounds of secrecy (or at least poor documentation) surrounding the sources of its data.[23] These allegations have led to efforts by the IUCN to improve its documentation and data quality, and to include peer reviews of taxa on the Red List.[16] The list is also open to petitions against its classifications, on the basis of documentation or criteria.[24]

In the November 2002 issue of *Trends in Ecology & Evolution*, an article suggested that the IUCN Red List and similar works are prone to misuse by governments and other groups that draw possibly inappropriate conclusions on the state of the environment or to affect exploitation of natural resources.[25]

In the November 2016 issue of *Science Advances*, a research article claims there are serious inconsistencies in the way species are classified by the IUCN. The researchers contend that the IUCN's process of categorization is "out-dated, and leaves room for improvement", and further emphasize the importance of readily available and easy-to-include geospatial data, such as satellite and aerial imaging. Their conclusion questioned not only the IUCN's method but also the validity of where certain species fall on the List. They believe that combining geographical data can significantly increase the number of species that need to be reclassified to a higher risk category.[26]

1994 IUCN Red List categories (version 2.3), used for species which have not been reassessed since 2001.

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Red Data Book of India

Critically Endangered Species	Examples
Critically Endangered Mammals	Kondana Rat, Malabar Civet, Kashmir Stag, River Dolphin
Critically Endangered Anthropods	Rameshwaram Parachute Spider, Peacock Tarantula
Critically Endangered Fish	Pookode Lake Barb, Ganges River Shark, Pondicherry Shark
Critically Endangered Amphibians and Reptiles	Gharial, White spotted bush frog, Toad skinned frog

IUCN Classification

Extinct (EX)

- When there is no reasonable doubt that the last individual of a taxon has died, it is considered Extinct.
- Extensive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), throughout a taxon's historic range fail to record an individual.

Extinct in the Wild (EW)

- A taxon is considered Extinct in the Wild when it is only known to survive in cultivation, captivity, or as a naturalised population (or populations) far outside its former range.
- Extensive surveys in known and/or expected habitat at appropriate times (diurnal, seasonal, annual) throughout a taxon's historic range fail to record an individual.[23]

Critically Endangered (CR)

- A taxon is Critically Endangered when the best available evidence indicates that it meets any of the Critically Endangered criteria.
    - Population reduction by criteria (> 90% in the last ten years).
    - Population size (a number less than 50 mature individuals).
    - Quantitative analysis indicates a 50% chance of extinction in the wild in the next ten years.
    - As a result, it is thought to be on the verge of extinction in the wild.

Endangered (EN)

- **An endangered species** is an organism that is on the verge of extinction
- A plant or animal species that is so rare that it is on the verge of extinction, particularly one that has been threatened by human activity.
- The destruction or pollution of a species' native habitat is a major factor in its endangerment or extinction.
- Other factors include overhunting, intentional extinction, and the unintentional or intentional introduction of alien species that compete for environmental resources with native species.[24]

Criteria for endangered species

- Population size has decreased by ≥70% in the last ten years or three generations, whichever is longer.
- The estimated extent of occurrence is less than 5,000 km2, and the estimated area of occupancy is less than 500 km2.
- Population size is estimated to be less than 2,500 mature individuals, with a continuing decline of at least 20% expected within five years.
- The population size is estimated to be less than 250 mature individuals.

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- Quantitative analysis indicates that the likelihood of extinction in the wild is at least 20% within 20 years or five generations.
-

Vulnerable (VU)

- A taxon is considered vulnerable when the best available evidence indicates that it meets any of the criteria for vulnerability, such as:
  - Population reduction (> 50% over the last 10 years).
  - The population is estimated to be less than 10,000 mature individuals.
  - The likelihood of extinction in the wild is at least 10% within the next 100 years.
  - As a result, it is thought to be on the verge of extinction in the wild.

Near Threatened (NT)

- A taxon is considered Near Threatened if it has been assessed against the criteria but does not currently qualify for Critically Endangered, Endangered, or Vulnerable, but is close to qualifying for or is likely to qualify for a threatened category in the near future.[24]
-

Least Concern (LC)

- When a taxon is considered Least Concern, it does not meet the criteria for Critically Endangered, Endangered, Vulnerable, or Near Threatened.
- This category includes taxa that are widespread and abundant.

Data Deficient (DD)

- When there is insufficient information to make a direct or indirect assessment of a taxon's risk of extinction based on its distribution and/or population status, the taxon is considered Data Deficient.
- Although a taxon in this category has been well studied and its biology is well understood, appropriate data on abundance and/or distribution are lacking.
- As a result, data deficiency is not a threat category. The inclusion of taxa in this category indicates that more information is needed and acknowledges the possibility that future research will reveal that the threatened classification is appropriate.[25]
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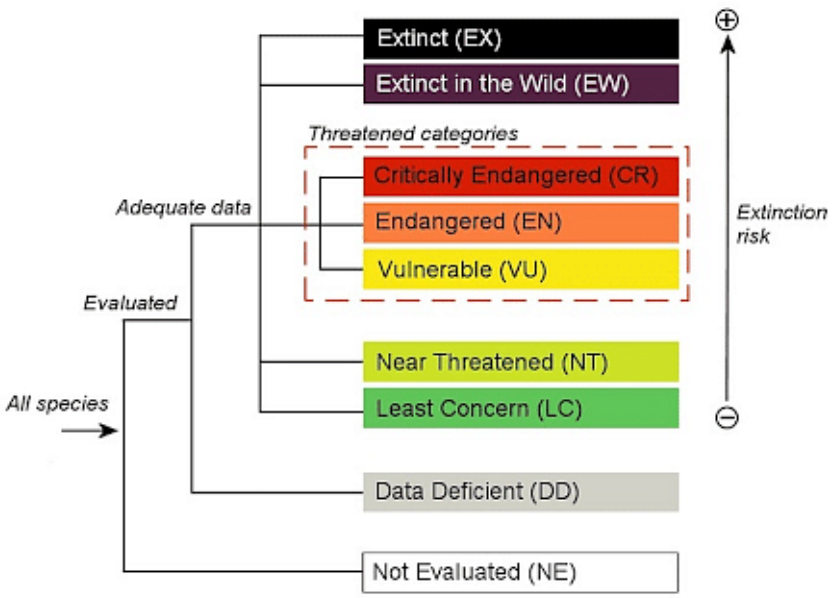
Not Evaluated (NE)

- When a taxon has not yet been evaluated against the criteria, it is classified as Not Evaluated.



IUCN Classification

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IV.CONCLUSIONS

The Red Data Book assists us in providing comprehensive information for research, studies, and program monitoring of rare and endangered species and their habitats. This book was written primarily to identify and protect species that are on the verge of extinction. The International Union for Conservation of Nature maintains the Red Data Book. The book is color-coded to make it easier to navigate through the various species.[26]

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