Topic 3 Biodiversity
Threats and Conservation of Species

By Peter Jamal

Knowledge Statements (IB)

Subunit	Understandings
3.2.1	Biological diversity is being adversely affected by both direct and indirect influences
3.2.2	Most ecosystems are subject to multiple human impacts.
3.2.4	The global conservation status of species is assessed by the International Union for the Conservation of Nature (IUCN) and is published as the IUCN Red List. Status is based on number of individuals, rate of increase or decrease of the population, breeding potential, geographic range and known threats
3.2.6	Investigate three different named species: a species that has become extinct due to human activity; a species that is critically endangered; and a species whose conservation status has been improved by intervention

Lesson Overview

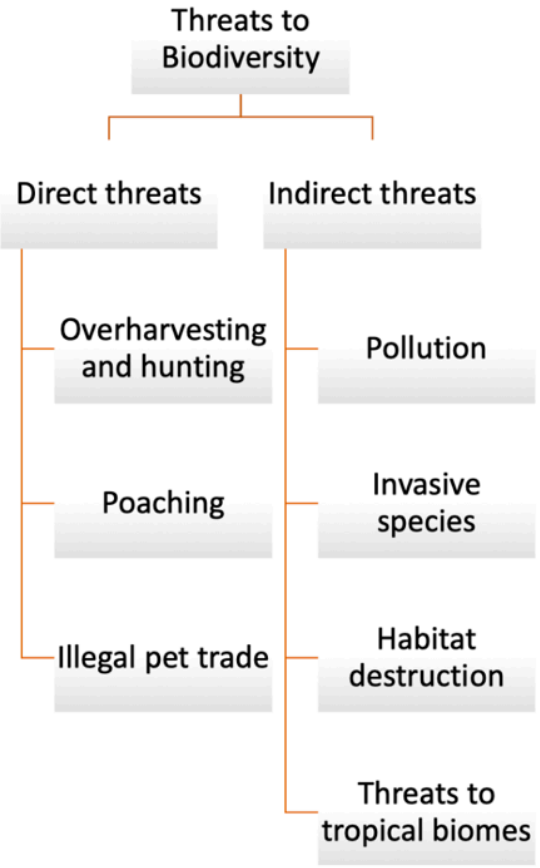
Steps	Activities / Learning Objectives
Starter	Identify the conservation status of Bornean Orangutan
Main activity 1	Exploring how to find the IUCN conservation status of some species Describe criteria that may be used by IUCN: • Population size and rate of population growth/decline • Geographical range • Breeding potential • Known threats Produce a poster to explain the IUCN status of a named species
Main activity 2	IUCN Fair/gallery walk • Each group will create a booth / setup their table to present their IUCN poster • They may create a video presentation i.e journalism presentation • Complete a worksheet
Plenary	Reflect on: • how each IUCN criteria is used to assign a conservation status on named species? • what are the benefits and limitations of IUCN status?

Prior Knowledge

Human activities generally impact the ecosystem in various ways.

When these effects combine, they intensify, leading to a larger and more significant threat.

For instance, numerous human activities contribute to global warming and climate change. The consequences of climate change are worldwide, weakening the resilience of many ecosystems.



[5 minutes]

Starter

Pongo pygmaeus

Picture source:
https://sandakan.rainforestlodge.com/

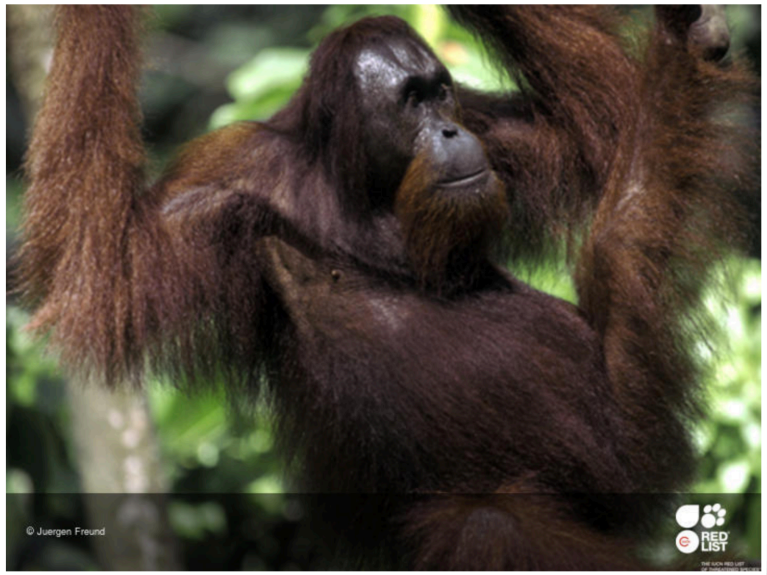
The Bornean orangutan is a species of orangutan found only on the island of Borneo. It is part of the sole genus of great apes native to Asia and is the largest among the three Pongo species. This orangutan has a rough, reddish-brown fur and arms that can reach up to 1.5 meters in length.

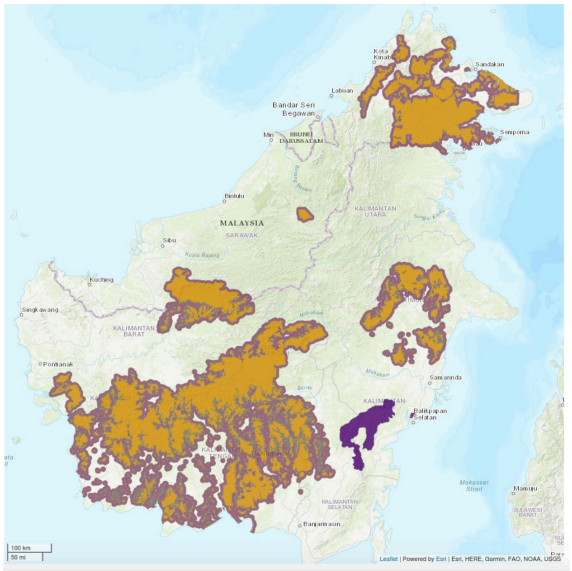
Activity:

Quick internet search on:

- State the conservation status of Bornean Orangutan
- Identify the organisation that gives the status
- State the criteria used to assign the status

Pongo pygmaeus





IUCN Conservation Status
Assigned by **IUCN**

Main threats

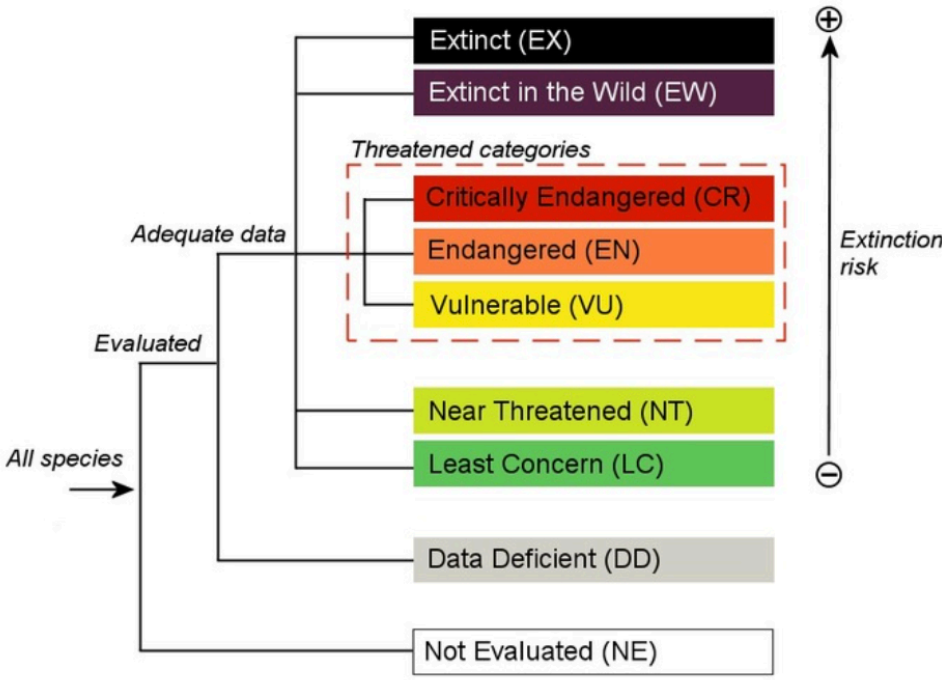
1. Habitat lost and degradation
2. Known threats such as hunting

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

IUCN

Objectives of IUCN Red List

- Identify species requiring some level of conservation
- Identify species for which there is concern about their conservation status
- Catalogue plants and animals facing a high risk of global extinction
- Raise awareness of animals and plants that face a higher risk of global extinction than others and therefore require conservation efforts



IUCN Red List Status Chart

Pongo pygmaeus

Previously Published Red List Assessments

2023 – Critically Endangered (CR)

2016 – Critically Endangered (CR)

2008 – Endangered (EN)

2007 – Endangered (EN)

2000 – Endangered (EN)

1996 – Vulnerable (VU)

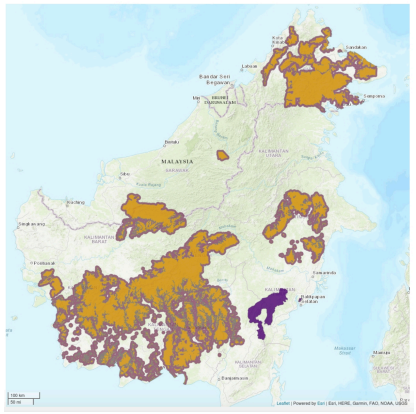
1994 – Endangered (E)

1990 – Endangered (E)

1988 – Endangered (E)

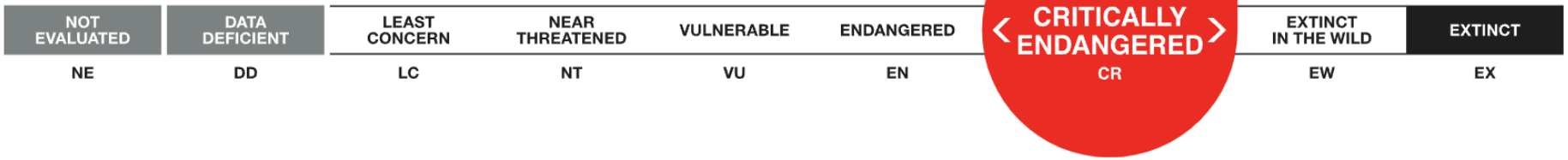
1986 – Endangered (E)

1965 – Unknown (N/A)



Look at the previously published IUCN statuses and read the Bornean Orangutan IUCN 2023 report

Outline IUCN criteria used that lead the changes in IUCN status of *Pongo pygmaeus*



IUCN Criteria

Previously Published Red List Assessments

2023 – Critically Endangered (CR)

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1996 – Vulnerable (VU)

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1986 – Endangered (E)

1965 – Unknown (N/A)

The changes in the status may be due to:

1. Population size
2. Population reduction
3. Geographical range and distribution
4. Breeding potential
5. Known threats
   - Habitat fragmentation
   - Habitat degradation (quality)

Factors Affecting Vulnerability of Species

- Narrow geographical range
- Small population size (low genetic diversity)
- Low population densities and large territories
- Few populations
- A large body
- Low reproductive potential
- Seasonal migrants
- Poor dispersers
- Specialised feeders or niche requirements
- Edible to humans and herding together
- Island organisms
- Prominent predator

Main Activity 1

https://www.iucnredlist.org/

[40 minutes]

Step 1: Case Study

Using IUCN reports, investigate using named species:

1. a species that has become extinct due to human activity
2. a species that is critically endangered
3. a species whose conservation status has been improved by intervention

Create a poster to summarise your investigation. You also create a supplementary journalism video

Options

Incilius periglenes
Camptorhynchus labradorius
Bostrychia bocagei
Rhynchobatus djiddensis
Rhinoceros unicornis
Grus japonensis

Main Activity 1

[20 minutes]

Step 2: Gallery Walk
Visit other booths or posters to consolidate your understanding about the IUCN conservation efforts

Complete the worksheet (table)

Species name	IUCN Status	Threats	Conservation effort(s)

Main Activity 2: IUCN Criteria

[20 minutes]

Step 1: From the gallery walk,

1. Complete the worksheet table by outlining how each IUCN criteria is used in assigning the conservation status of species

2. Read the criteria used in assigning different IUCN statuses
   - Reading Material: IUCN Red List Categories and Criteria, version 3.1, second edition
   - Page 16 – 22

3. Summarise the criteria into a visual representation. The generalise each criterion

Criteria	Statuses		
	CR	EN	VU

Plenary: IUCN Criteria

Number of individuals

Species with smaller populations are more likely to go extinct as they tend to have low genetic diversity and therefore an inability to adapt to changing conditions that can prove fatal. Many of the large cat species, such as cheetahs, snow leopards and tigers, are in this category.

Reduction in population size

A reduction in population size may indicate that a species is under threat. For example, numbers of European eel (*Anguilla anguilla*) (Figure 3.50) are at their lowest ever levels in most of its range and they continue to decline.

Geographic range

Species that occupy a restricted habitat are likely to be wiped out. For example, the slender-billed grackle (*Cassidix palustris*), a bird which once occupied a single marsh near Mexico City, was driven to extinction when a reduction in the water table drained the marsh.

Distribution

Species that live in a small area are under greater threat from extinction than those that are distributed more widely. Loss of the area they live in will lead to loss of the species. The peacock parachute tarantula (*Poecilotheria metallica*) (Figure 3.51) is known from a single location in the Eastern Ghats of Andhra Pradesh in India. Reasons for being on the Red List: restricted range and habitat loss caused by logging for firewood and timber.

Breeding potential

Animals that live a long time and have long gestation times, for example elephants and rhinos, have low rates of reproduction and can take many years to recover from any reduction in population number. This makes them vulnerable to extinction. If a change in habitat or the introduction of a predator occurs, the population decreases and there may be too few reproductive adults to support and maintain the population. Because they are slow to reproduce, any loss in numbers means a fast decline. The Steller's sea cow was heavily hunted and unable to replace its numbers quickly enough. Orangutans have one of the slowest reproductive rates of all mammal species as they give birth to a single offspring only once every 6 to 8 years. As they have such a low reproductive rate, even a small decrease in numbers could lead to their extinction.

Known threats

Degree of fragmentation

Fragmentation occurs when parts of a habitat are destroyed, leaving smaller unconnected areas. Species in fragmented habitats may not be able to maintain large enough population sizes. The Sumatran rhinoceros (*Dicerorhinus sumatrensis*)

lives in tropical rainforest in South-East Asia. Fragmentation of the forest through deforestation and conversion to plantation forest has led to a reduction in habitat area for this species.

Quality of habitat

Species that live in poor-quality habitats are less likely to survive than species that live in higher quality habitats. For example, the fishing cat (*Prionailurus viverrinus*, see Figure 3.52) is found in South-East Asian wetland areas. The drainage of these wetland areas for agriculture has led to a reduction in habitat quality.

Exit Questions

- Reflect on the IUCN criteria and how they can be used to protect species
- Outline the possible impacts of moving some species from Endangered to Vulnerable – could this be controversial?