

EXAMPLES OF ECOLOGICALLY RARE SPECIES

EMBARGOED

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Global distribution and conservation status of ecologically rare mammal and bird species. Nicolas Loiseau*, Nicolas Mouquet*, Nicolas Casajus, Matthias Grenié, Maya Gueguen, Brian Maitner, David Mouillot, Annette Ostling, Julien Renaud, Caroline Tucker, Laure Velez, Wilfried Thuiller, Cyrille Violle. *Nature Communications*, [October 8, 2020]. DOI : 10.1038/s41467-020-18779-w*Co-first authors.

To assess ecological rarity, scientists from the FRB's Centre de Synthèse et d'Analyse de la Biodiversité (CESAB), CNRS research laboratories, Université Grenoble Alpes, and the University of Montpellier combined data available to the scientific community on the (i) geographical restrictiveness and the (ii) functional distinctiveness of animal species. A species is deemed ecologically rare if its geographic range is very limited and it has a unique ecological function. The ecological 'role' of species in their ecosystems is often indirectly deduced from their functional traits (e.g. size, diet, and lifestyle). The researchers hypothesized that the more unique the functional traits of a species, the more unique (and therefore less replaceable) its ecological role. The functional traits considered in this study were body mass, diet (e.g. fruits, insects, or detritus), foraging height (e.g. on the ground or in the trees), and activity cycle (i.e. diurnal or nocturnal). Ecologically rare mammals tend to be heavier, nocturnal, and consumers of fruits or invertebrates. Examples include bats and certain monkeys and lemurs. Ecologically rare birds mainly feed on fruit; nectar, as do hummingbirds; or fish, as do certain marine birds.

Here we present some notable examples of ecologically rare species, including *Macaca nigra* (famous for having taken a selfie in 2014), the photogenic *Leontocebus tripartitus* and *Callithrix flaviceps*, and the 'tree kangaroos' *Dendrolagus lumholtzi* and *Dendrolagus matschiei*. You'll also meet New Caledonian native *Ducula goliath*, the largest tree-dwelling pigeon in the world, and *Strigops habroptila*, the only parrot that cannot fly. Though they are not representative of the majority of ecologically rare species studied, they do illustrate some of the scientists' findings: some are (1) not endangered according to IUCN criteria, but their functional distinctiveness is an argument for their conservation (e.g. *Leontocebus tripartitus* and *Ninox squamipila*) (2) found in countries with a high development index (HDI), contradicting the common assumption that conservation only concerns low-HDI nations (e.g. *Dendrolagus lumholtzi*, *Pteropus vetulus*, *Ducula goliath*, and *Strigops habroptila*) (3) poorly protected by the world's existing network of nature reserves (e.g. *Amazilia luciae*, *Macaca nigra*, *Dendrolagus matschiei*, and *Centrocercus minimus*) (4) expected to be hit especially hard by future climate change effects (e.g. *Myrmecobius fasciatus* and *Callithrix flaviceps*).

Amazilia luciae (Honduran Emerald)

Today this hummingbird is only found in four arid valley locations within the interior of its native Honduras. It lives in very dry forests and shrubland at a maximum of approximately 1,220 m. By eating nectar it contributes greatly to pollination. These birds have very high metabolisms. A hummingbird can digest a fruit fly in 10 min.

IUCN Red List status: Endangered



Photo source: Dominic Sherony.

Link to photo:

https://upload.wikimedia.org/wikipedia/commons/f/fb/Honduran_Emerald_%28Amazilia_luciae%29_%282495402213%29.jpg.

Callithrix flaviceps (buffy-headed marmoset)

This primate belongs to the family Callitrichidae. Endemic to Brazil, it is found in mountainous areas of the Atlantic Forest and on forested plateaus of the interior. Its diet mostly (64.8%) consists of mushrooms. Of all the marmosets, this one is the most threatened by deforestation, and it is greatly impacted by the wildfires regularly seen in Brazil. Their geographic range is predicted to shrink by 68% within two to four decades.

IUCN Red List status: Critically Endangered.



Photo source: Giovanni Mari.

Link to photo:

https://fr.wikipedia.org/wiki/Callithrix_flaviceps#/media/Fichier:Callithrix_flaviceps.jpg.

Centrocercus minimus (Gunnison grouse)

A member of the family Phasianidae, this bird is native to the Gunnison River basin of Colorado. Because of its similarity to the sage grouse (*Centrocercus urophasianus*), *C. minimus* was neglected in the 1990s. Only in 2000 was it recognized as a separate species. *C. minimus* eats pine needles, buds, leaves, and berries, as well as ants and beetles. Every spring, males gather in mating areas known as *leks*, where they perform courtship dances. Onlooking females select the most attractive males with which to mate.

IUCN Red List status: Endangered.



Photo source: Gary Kramer.

Link to photo:

https://fr.wikipedia.org/wiki/T%C3%A9tras_du_Gunnison#/media/Fichier:SageGrouse_21.jpg.

***Dendrolagus lumholtzi* (Lumholtz's tree kangaroo)**

This nocturnal arboreal kangaroo occupies a very limited geographic range, within the tropical rain forests of Queensland, Australia. It dines on leaves and fruits, spends 99% of its time in the treetops, and naps about 15 hours a day. *D. lumholtzi* can leap several metres from one tree to another. It plays a major role in seed dispersal.

IUCN Red List status: Near Threatened.

Photo source: Darcy Moore.

Link to photo:

<https://content.eol.org/data/media/81/05/0e/542.7506862076.jpg>.



***Dendrolagus matschiei* (Huon tree kangaroo)**

Living in New Guinean montane rain forests 1,100 to 3,300 m above sea level, where it feeds on the leaves of various trees, sap, flowers, fruit, and moss, this tree kangaroo is threatened by deforestation and hunting. It is the marsupial boasting the longest recorded gestation period (41 days). *D. matschiei* can leap 9 m between trees.

IUCN Red List status: Endangered.

Photo source: Andrea Bohl.

Link to photo:

<https://pixabay.com/fr/photos/dendrolague-océanie-dendrolagus-1385575/>.



***Ducula goliath* (New Caledonian imperial pigeon)**

The largest arboreal pigeon in the world, *D. goliath* lives in the primary rain forest of New Caledonia, eating fruits and berries. It is threatened with extinction due to hunting and habitat destruction by humans. The female rarely lays more than a single egg each year.

IUCN Red List status: Near Threatened.

Photo source: Jean-François Silvain, President of FRB.



***Macaca nigra* (Celebes crested macaque)**

The Indonesian island of Sulawesi is the home of this macaque. It is found in the few protected forests of North Sulawesi, on Minahasa Peninsula. Included in its diet are over 145 species of fruits, and *M. nigra* is crucial for the dispersal of seeds from many trees. In 2014, a Celebes crested macaque took a selfie with the camera of British photographer David Slater.

IUCN Red List status: Critically Endangered.

Photo source: David Slater.

Link to photo:

<https://pixabay.com/fr/photos/macaca-nigra-selfie-autoportrait-536991>.



***Myrmecobius fasciatus* (numbat)**

The sole member of its genus and family (Myrmecobiidae), this insectivorous marsupial is only found in the eucalyptus forests of southern Australia and was probably greatly harmed by the Australian wildfires of 2019 and 2020. *M. fasciatus* is very specialized, exclusively eating termites— from 15,000 to 20,000 daily, which stacks up to about 10% of its body weight. Its range is expected to be reduced by 54% within two to four decades.

IUCN Red List status: Endangered.

Photo source: Seashalia Gibb.

Link to photo:

<https://pixabay.com/fr/photos/numbat-l-australie-occidentale-perth-4070485/>.



***Ninox squamipila* (Seram boobook)**

Hailing from the rain forests of the Indonesian islands of Seram and Ambon, this owl (family Strigidae) is limited to a very small geographical area and threatened by deforestation.

IUCN Red List status: Least Concern.

Photo source: Kerrie Cogger.

Link to photo:

<https://pixabay.com/fr/photos/le-sud-de-boobook-chouette-3526460/>.



***Pteropus vetulus* (New Caledonia flying fox)**

P. vetulus lives in rocky habitats or caves in New Caledonia. It eats fruit, pollinating and dispersing seeds. Of all the members of its taxonomic family, *P. vetulus* has the largest encephalization quotient (which reflects the ratio of actual brain size to expected brain size for an animal of its weight)—equal to that of domestic dogs.

IUCN Red List status: Near Threatened.

Photo source: Maksim Shutov.

Link to photo: <https://unsplash.com/photos/Ye2xXbiNaTs>.



***Leontocebus tripartitus* (golden-mantle saddleback tamarin)**

This diurnal arboreal primate belongs to the family Cebidae. It is found in rain forests of north-east Ecuador and the northern tip of Peru. Its diet consists of fruit, insects, and plant exudates. *L. tripartitus* lives in groups with only one sexually active, dominant female, who mates with several males. The golden-mantle saddleback tamarin plays a very important role in pollination and seed dispersal.

IUCN Red List status: Near Threatened.

Photo source: Sandy Torchon.

Link to photo: <https://www.pexels.com/fr-fr/photo/animal-mignon-arbre-zoo-3973557/>.



***Strigops habroptila* (kakapo)**

A New Zealand native, the nocturnal kakapo stands out among parrots as the heaviest and the only one that doesn't fly. However, it has the longest life expectancy among bird species. The kakapo occupies a niche normally associated with mammals. It eats native plants, seeds, fruits, pollen, and even sapwood. Huge efforts have been made to restore its population. The kakapo figures prominently in Maori folklore and beliefs.

IUCN Red List status: Critically Endangered.

Photo source: Mike Bodie.

Link to photo:

https://en.wikipedia.org/wiki/Kakapo#/media/File:Sirocco_full_length_portrait.jpg.

