



The Critically Endangered spotted tree frog is not included in Australia's priority threatened species list.

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## Australia's biodiversity crisis and opportunity

Australia is failing to meet its international obligations to conserve its unique native biodiversity and ecosystems. Most of Australia's plants and animals are found nowhere else on Earth, but since colonization about 230 years ago, at least 100 endemic species have been driven to extinction (1), and 17 ecosystems spanning the continent are now showing signs of collapse (2). Many more species face the same grim fate, with more than 1900 species and ecological communities currently listed as of conservation concern (3) under Australia's centerpiece environmental legislation, the Environment Protection and Biodiversity Conservation Act 1999. Numerous reports (4) demonstrate that Australia is simply not doing enough to address key threats to biodiversity, including land clearing and urbanization, invasive species, altered fire regimes, pollution, disease, and climate change. Despite being a member of the G20, Australian federal and state government environmental spending is well short of what's required (5) to reverse the nation's biodiversity extinction trajectory.

A stark example of this failure is the newly announced priority threatened species list. Just 100 threatened species (6)—fewer than 6% of the country's listed threatened species—are earmarked for conservation attention and AUS \$10 million of new funding, equating to about \$100,000 per species. Of Australia's Critically Endangered or Endangered species, only 2 of 25 frog species (8%), 7 of 53 invertebrate species (13.2%), and 28 of 776 plant species (3.6%) make the priority list (3, 6).

Stronger environmental laws, combined with a substantial increase in investment in environmental and conservation spending, will not only benefit Australia's biodiversity but also undoubtedly deliver substantial social, cultural, and economic benefits (7). The international community is moving to implement a new post-2020 global biodiversity framework, and heads of state recently met at the United Nations Climate Change Conference to chart a course to avert the climate change crisis deepening. Australia must be a leader of change, not a laggard.

**Euan G. Ritchie**

School of Life and Environmental Sciences,  
Centre for Integrative Ecology, Deakin  
University, Burwood, VIC 3125, Australia.  
Email: e.ritchie@deakin.edu.au

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## Protect the Amazon's Indigenous lands

The dramatic increase in the Brazilian Legal Amazon (BLA) deforestation rates since 2019 (1, 2) contrasts with Brazil's goal to achieve zero illegal deforestation in 2028 (3). The 2021 BLA official deforestation rate was the highest in 15 years. The total deforested area in 2021 (13,235 km<sup>2</sup>) is 69% above the average annual deforestation rate from 2012 to 2021 (4). This increase in deforestation affects not only private lands but also protected areas, including Indigenous lands.

Indigenous lands act as "shields" against deforestation (5). Alarming, deforestation within these lands is increasing. The annual average deforestation rate within Indigenous lands in the past 3 years (419 km<sup>2</sup>) is 80.9% above the average annual rate from 2012 to 2021 (4).

One example of this noticeable increase is the Apyterewa Indigenous land, located in the state of Pará. A deforestation incursion started in 2018 (6); however, no effective law enforcement actions were taken to stop land grabbers. Consequently, deforestation in Apyterewa spiked in 2021, accounting for 20.7% of the deforestation within all Indigenous lands (4). The increase in mining and smoke pollution that follows deforestation puts at risk Indigenous peoples (7, 8), especially the isolated ones. It also violates International Labour Organization Convention 169, of

which Brazil is a signatory. This agreement guarantees the participation of Indigenous peoples in the management and conservation of their territories (9).

The conservation of Indigenous lands is paramount for honoring Brazil's legal commitments, maintaining Amazonian environmental stability, fighting climate change, and guaranteeing traditional peoples' well-being. The existence of laws for preserving Amazonian remaining forests and traditional peoples' rights is not enough. Effective law enforcement actions are required to protect the last intact and preserved Amazon frontiers (10, 11).

**Guilherme Mataveli\*** and **Gabriel de Oliveira<sup>2</sup>**

<sup>1</sup>Earth Observation and Geoinformatics Division, National Institute for Space Research (INPE), São José dos Campos, SP, 12227-010, Brazil.

<sup>2</sup>Department of Earth Sciences, University of South Alabama, Mobile, AL 36688, USA.

\*Corresponding author.

Email: mataveli@alumni.usp.br

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## Mining and Brazil's Indigenous peoples

Mining companies have 3481 requests pending with Brazil's National Mining Agency for permission to prospect in the country's Indigenous lands, even though it is currently illegal (1). The companies submitting the requests will gain priority for approval if mining in these areas is made legal in the future. The Bolsonaro presidential administration has curtailed inspections and greatly weakened protection of Indigenous lands against invasion (2). The frequency and scale of assaults on Indigenous land, especially from mining,

have increased greatly (3). Urgent judicial action, or credible threats of judicial action, could stop this trend.

On 5 December 2021, investigative journalists discovered that Brazil's federal government had authorized seven gold-mining projects in the "Dog's Head" (cabeça do cachorro), an area inhabited by 23 Indigenous peoples in the northwestern corner of the country (4). Brazil's federal Public Ministry initiated an investigation into the authorizations, and on 27 December the authorizations were canceled (5). The prosecutors in the federal Public Ministry believe that the mining authorizations in the Dog's Head were preparation for the opening of Indigenous lands throughout Amazonia to mining (6), a change that would become legal once the National Congress approves a bill that would open Indigenous land to mining, dams, and agribusiness (PL 191/2020) (7). President Bolsonaro, who submitted the bill, has requested special priority for it from the coalition of political parties that supports him and now controls both houses of Congress (8).

More than 20,000 "wildcat" gold miners (*garimpeiros*) have invaded the Yanomami Indigenous land, located just northeast of the Dog's Head (9). Both the Yanomami Indigenous land and the Dog's Head are also under the threat of corporate mining based on the many pending requests for mining licenses. Both of these areas contain isolated Indigenous peoples who are not in contact with the majority of Brazilian society (7). Isolated peoples are in particular danger given the insufficiently protective policies of Brazil's agency for Indigenous affairs (10). On 8 December 2021, Brazil's Ministry of Women, Family, and Human Rights began a process to classify cattle ranchers and wildcat gold miners as "traditional peoples," which would allow them to legally remain in conservation units (protected areas for biodiversity) and, potentially, in Indigenous lands (11).

Brazil's Public Ministry must act quickly to obtain judicial orders revoking the mining clearances. Judicial orders will also be needed to induce the presidential administration to remove illegal miners from the Yanomami and many other Indigenous lands. The countless actions of the Bolsonaro presidential administration in violation of Indigenous rights can no longer be ignored by the International Criminal Court in The Hague, where multiple cases remain pending (12).

**Lucas Ferrante<sup>1\*</sup>** and **Philip M. Fearnside<sup>2</sup>**

<sup>1</sup>National Institute for Research in the Amazon (INPA), Ecology Graduate Program, 69060-001, Manaus, AM, Brazil. <sup>2</sup>National Institute for

Research in the Amazon (INPA), 69067-375 Manaus, AM, Brazil.

\*Corresponding author.

Email: lucasferrante@hotmail.com

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#### TECHNICAL COMMENT ABSTRACTS

##### Comment on "The influence of juvenile dinosaurs on community structure and diversity"

Roger B. J. Benson, Caleb M. Brown, Nicolás E. Campione, Thomas M. Cullen, David C. Evans, Lindsay E. Zanno

Schroeder et al. (Reports, 26 February 2021, p. 941) reported a size gap among predatory dinosaur species. We argue that the supporting dataset is skewed toward Late Cretaceous North America and that the gap was likely absent during other intervals in most geographic regions. We urge broader consideration of this hypothesis, with quantitative evaluation of preservational and dataset biases.

Full text: [dx.doi.org/10.1126/science.abj5976](https://doi.org/10.1126/science.abj5976)

##### Response to Comment on "The influence of juvenile dinosaurs on community structure and diversity"

Katlin M. Schroeder, S. Kathleen Lyons, Felisa A. Smith

The analysis of dinosaur ecology hinges on the appropriate reconstruction and analysis of dinosaur biodiversity. Benson et al. question the data used in our analysis and our subsequent interpretation of the results. We address these concerns and show that their reanalysis is flawed. Indeed, when occurrences are filtered to include only valid taxa, their revised dataset strengthens our earlier conclusions.

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Euan G. Ritchie

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