Brazil's caves, home to diverse species and minerals, were stripped of protections by a recent presidential decree.

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Brazilian cave heritage under siege

Under President Jair Bolsonaro, Brazil has neglected environmental protection (*1*). Until recently, subterranean environments were largely safeguarded; although some caves could be destroyed for the purposes of exploiting mineral resources or urban development, those classified as presenting maximum cultural, geological, and/or biological value had to be preserved (*2*). However, a January presidential decree (*3*) allows the destruction of even those caves with maximum relevance, representing a substantial step backward for subterranean conservation.

The new decree ignores the irreplaceable scientific value of Brazilian caves. Researchers have documented hundreds of endemic obligate cave species, including animals with unique adaptations (*4*). Thousands of species still lack formal descriptions, and many more species await discovery. At least 72 bat species roost in Brazilian caves and provide critical ecosystem services such as pest control (*5*). The geodiversity of these caves is also exceptional, with many sites harboring rare minerals and geological formations found nowhere else (*6*). Finally, the multitude of archeological and paleontological cave sites across the country provide a unique record of Brazil's past.

Bolsonaro's decree increases the extinction risk of unique species. By ignoring the intrinsic and utilitarian values of Brazilian caves, the policy neglects global conservation strategies to safeguard the subterranean biome (*7*, *8*), violates the principles of both the Federal Biodiversity Policy (*9*) and the Convention on Biological Diversity (*10*), and fails to align with Sustainable Development Goals. The potential losses of unique species, ecosystem services, and new industrial chemicals (which could be derived from the microbes found in the caves) (*11*) are unpredictable. In addition, because causing species extinction could damage a company's reputation, the policy could undermine the mining sector that the administration seeks to support. We cannot allow these ecosystems to be obliterated by short-sighted decrees.

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REFERENCES AND NOTES

1. H. Escobar, *Science*, 10.1126/science.aay9103 (2019).
2. Decreto nº 6.640, de 07 de novembro de 2008 (2008); www.planalto.gov.br/ccivil_03/_Ato2007-2010/2008/Decreto/D6640.htm [in Portuguese].
3. Decreto nº 10.935, de 12 de janeiro de 2022 (2022); www.in.gov.br/en/web/dou/-/decreto-n-10.935-de-12-de-janeiro-de-2022-373591582 [in Portuguese].
4. K. Yoshizawa *et al.*, *Curr. Biol.* **24**, 9 (2014).
5. R. A. Medellín, R. Wiederholt, L. Lopez-Hoffman, *Biol. Conserv.* **211**, 45 (2017).
6. C. J. Schenk, R. J. Viger, C. P. Anderson, "Maps showing geology, oil, and gas fields and geologic provinces of the South America region: U.S. Geological Survey Open-File Report 97-470-D" (1999); https://pubs.er.usgs.gov/publication/ofr97470D.
7. J. J. Wynne *et al.*, *Conserv. Lett.* **14**, e12834 (2021).
8. D. Sánchez-Fernández *et al.*, *Nat. Clim. Change* **11**, 458 (2021).
9. Decreto nº 4.339 de 22 de agosto de 2002 (2002); www.planalto.gov.br/ccivil_03/decreto/2002/D4339.htm [in Portuguese].

10. Convention on Biological Diversity (www.cbd.int).
11. P. N. da Costa Souza *et al.*, *Afr. J. Microbiol. Res.* **7**, 483 (2013).

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Brazil's mangroves: Natural carbon storage

Brazil has the second-largest area of mangrove cover in the world (*1*), including the world's largest continuous mangroves (*2*). These ecosystems provide food security for coastal populations; habitat for terrestrial, bird, and fish species; and carbon sequestration (*3*). However, Brazil's mangroves are in peril. In 2020, the Brazilian government approved legislation that would have eliminated mangrove protection for the benefit of real estate development (*4*). Fortunately, in December 2021, the Brazilian Supreme Court found the controversial policy unconstitutional (*5*). Brazil must continue to protect its mangroves despite an administration that has shown disregard for the environment (*6*).

Mangrove conservation doubles as an effective natural climate solution (*7*). Mangroves can store up to 10 times more carbon per hectare than upland forests (*8*), and Brazil's mangrove soil currently stores about 3 to 8% of global carbon (*9*). Yet these ecosystems and their vast natural carbon storage potential are vulnerable to emissions from anthropogenic activities and, if lost, could not be restored by 2050 (*10*).

The attempts to change legislation to prioritize development over mangroves demonstrate that current protections are threatened. Including Brazil's mangroves in the national Reducing Emissions from Deforestation and Forest Degradation (REDD) strategy could be a way to maintain the carbon stocks and better protect their biodiversity. Although there is a civil society initiative for monitoring Brazilian mangroves (*11*, *12*), Brazil should also create an official monitoring program to ensure effective conservation and enforcement of the policies in place to protect these ecosystems.

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REFERENCES AND NOTES

1. M. Spalding, *World Atlas of Mangroves* (Routledge, 2010).
2. W. R. Nascimento *et al.*, *Estuar. Coast. Shelf Sci.* **117**, 83 (2013).
3. S. Y. Lee *et al.*, *Glob. Ecol. Biogeogr.* **23**, 726 (2014).
4. A. C. Amaral, "Salles atacará normas de proteção de terras, águas e ar em revogaço nesta segunda" (2020); https://ambiencia.blogfolha.uol.com.br/2020/09/27/salles-atacara-normas-de-protecao-de-terras-aguas-e-ar-em-revogaco-nesta-segunda [in Portuguese].
5. P. Watanabe, "STF restaura proteção a mangues e restingas, por unanimidade" (2021); https://www1.folha.uol.com.br/ambiente/2021/12/stf-restaura-protecao-a-mangues-e-restingas-por-unanimidade.shtml [in Portuguese].
6. F. P. Ottoni *et al.*, *Biota Neotrop.* **21**, 2 (2021).
7. P. I. Macreadie *et al.*, *Nat. Rev. Earth Environ.* **2**, 826 (2021).
8. J. Howard *et al.*, *Front. Ecol. Environ.* **15**, 42 (2017).
9. V. Hatje *et al.*, *Limnol. Oceanogr.* **66**, 321 (2021).
10. M. L. Noon *et al.*, *Nat. Sustain.* **5**, 37 (2022).
11. C. M. Souza *et al.*, *Remote Sens.* **12**, 2735 (2020).
12. C. Diniz *et al.*, *Remote Sens.* **11**, 808 (2019).

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Disrupting targets' dependency on bullies

Targets of academic bullying sometimes despair about the lack of institutional support they receive. Even when universities take a firm stance against perpetrators [e.g., (*1*, *2*)], it is very difficult to disrupt the dependency of the target on the bully. Institutions must put policies in place to allow targets to extricate themselves and their work from the perpetrator without compromising their careers.

To address the issue of academic bullying, many recommendations focus on punishing perpetrators (e.g., prohibiting the known bullies from leading labs), which is in line with domestic abuse legislation in some countries, such as Austria (*3*). However, simply removing the bully does not protect the target from their influence. Another common solution is to transfer targets to another lab (*4*–*7*), but many targets do not perceive this as a viable option; after years trying to pursue their research goals, changing labs would mean losing their projects, associated publications, and access to letters of recommendation, which can be career-breaking for early-stage academics.

The scientific community must implement policies that grant targets of bullying independence. For example, if the allegations of bullying behaviors are validated (e.g., through confirmation by institutional investigation committees), institutions can grant the targets the rights to the lab's data, allowing them to publish. Institutions can also ban the perpetrators from submitting letters of recommendation for targets and designate others, such as department chairs, to write such letters instead. Medical students, PhD students, and postdocs should have the right to independently pursue research and publication projects when supervisors are known to engage in bullying behaviors. This would serve as a fail-safe for situations in which the career success of the target would otherwise be contingent on staying in a bully's group.

Granting bullying targets these rights would allow them to protect their mental health without sacrificing their professional success. If lab members knew that they could continue their work independently, they would likely tolerate fewer bullying behaviors. Empowerment would lower the bar to reporting inappropriate behavior as well. Protecting targets is crucial to stemming the tide of academic bullying behavior.

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REFERENCES AND NOTES

1. C. Flaherty, "No more passing the harasser," *Inside Higher Education* (2018); www.insidehighered.com/news/2018/09/25/u-wisconsin-system-proceeds-plan-disclose-misconduct-findings-against-employees.
2. M. N. Bolotnikova, "Jorge Domínguez loses emeritus status after misconduct investigation," *Harvard Magazine* (2019). www.harvardmagazine.com/2019/05/jorge-domínguez-loses-emeritus-status.
3. B. Haller, "The Austrian legislation against domestic violence" (2005); www.ikf.ac.at/english/austrian_legislation_against_domestic_violence.pdf.
4. J. Stebbing *et al.*, *Postgrad. Med. J.* **80**, 93 (2004).
5. L. Yarwood-Ross, C. Haigh, *Nurse Res.* **24**, 38 (2014).
6. K. H. Hunter, K. Devine, *Int. J. Doct. Stud.* **11**, 35 (2016).
7. S. Moss, M. Mahmoudi, *EClinicalMedicine* **40**, 101121 (2021).

COMPETING INTERESTS

S.T. is a member of the advisory board at the Academic Parity Movement (www.paritymovement.org), a nonprofit organization dedicated to addressing academic discrimination, violence, and incivility. M.M. is a cofounder and director of the Academic Parity Movement and receives royalties/honoraria for his published books, plenary lectures, and licensed patents.

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