Moore Center for Science
BREAKTHROUGHS
2020

CONSERVATION
INTERNATIONAL

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THANK YOU

To our supporters past and present.

Science and nature are our most powerful allies

in the fights against climate change, biodiversity loss, and future pandemics.

As you read ahead, please know that you

are part of every one of these accomplishments.

While the global challenges of 2020 have been daunting, they also provided Conservation International and the Betty and Gordon Moore Center for Science an opportunity to demonstrate the importance of science and its application in forging a path forward. In 2020:

- We published a series of articles, including a study in *Science*, that is providing key insights for pandemic prevention and recovery.

- We completed a suite of foundational global analyses, including a recent *Nature* study, that will guide conservation policy and finance for decades.

- We increased our investment in conservation technology, including our near-real-time wildlife monitoring app Wildlife Insights, as an emerging opportunity for transformative global change.

Dear Friends,

As one of the world's premier conservation research units, the Moore Center for Science is publishing breakthrough research and growing the body of evidence upon which humanity depends. Our leadership in response to the COVID-19 pandemic illustrates the creativity, rigor, and relevance that are hallmarks of Conservation International.

As shown in this report, we quickly organized ourselves and partners to address the pandemic's impact on nature and its role in pandemic prevention and recovery while continuing to advance our longstanding strategic priorities. Our findings are now the scientific cornerstone for numerous initiatives designed to secure nature and safeguard humanity through novel policies and billions in conservation financing.

We believe 2021 will be a turning point in the quest for a more sustainable future. With renewed public and political appreciation for science, new leadership in the White House, and critical international policy negotiations scheduled for completion, now is the time for cutting-edge, policy-relevant science.

Thank you for all the ways you support conservation science. It is precisely during these difficult times that we must remain focused to address the grand challenges of today and tomorrow.

Sincerely,
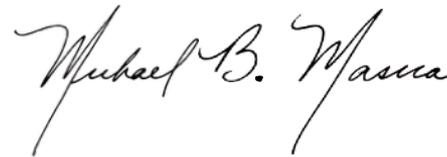
Michael B. Mascia

Michael B. Mascia, Ph.D.
Senior Vice President
Moore Center for Science

OUR SCIENCE STRATEGY

Driven in large measure by the work of the Moore Center for Science, Conservation International's institutional strategy — a.k.a our Southern Cross — is dedicated to generating specific solutions to the most pressing conservation and development issues facing the planet.

This strategic focus has enabled us to launch a systematic process to identify and answer three basic, yet deceptively complex, questions that are central to the quest for sustainability.

Where is the nature that people need?

How can we best conserve nature for people?

What are the impacts of conserving nature?

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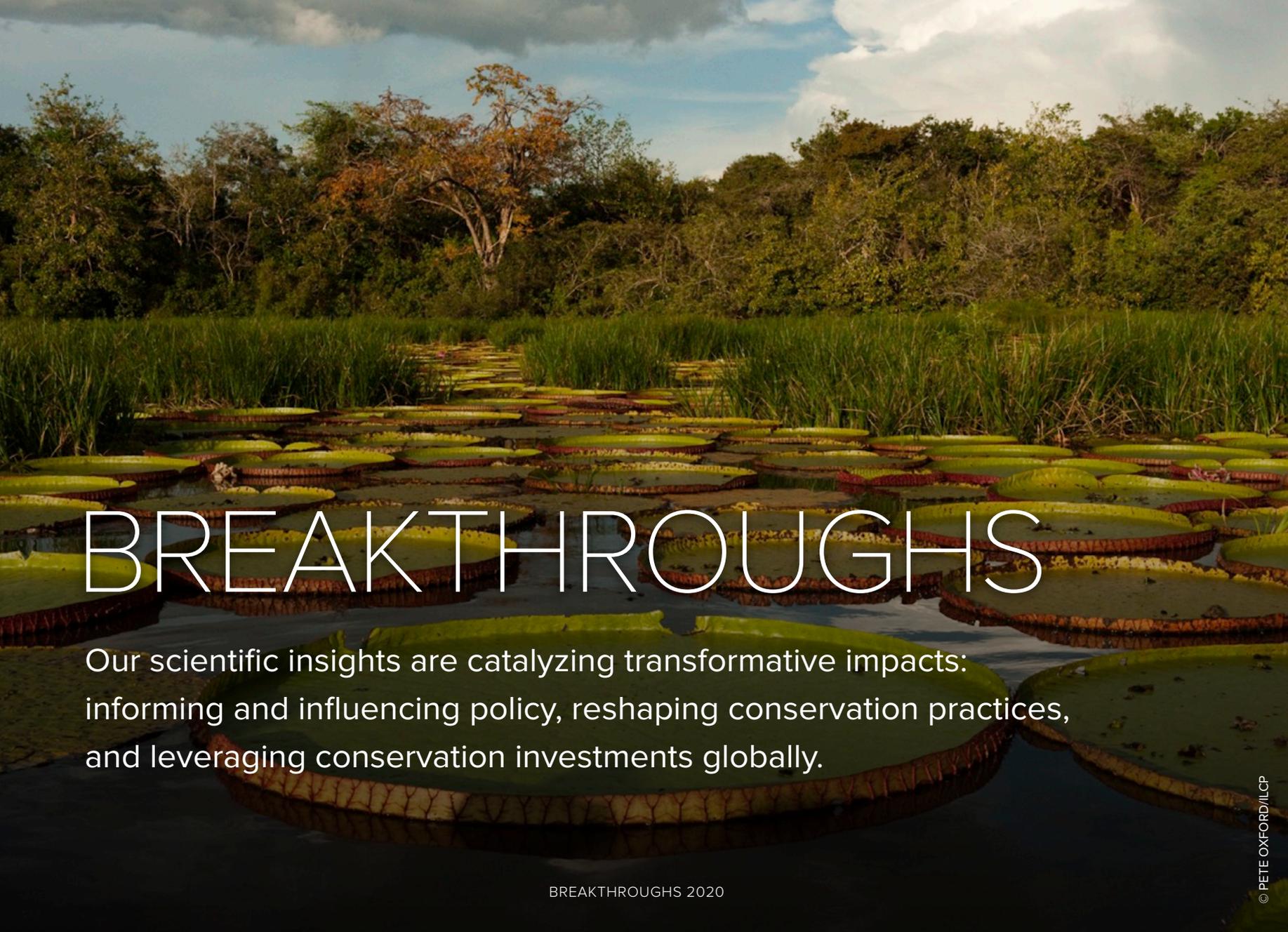
BREAKTHROUGHS

Our scientific insights are catalyzing transformative impacts: informing and influencing policy, reshaping conservation practices, and leveraging conservation investments globally.

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PRIORITIES

WHERE IS THE NATURE PEOPLE NEED?

Nature has a crucial role to play in global sustainability, but we require a better and more nuanced understanding of nature's part in sustainable development at global, national, and landscape/seascape scales. Put plainly, we need to understand where nature makes essential contributions to humanity in order to set priorities and guide investment.

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PRIORITIES

Irrecoverable Carbon in Ecosystems

Identifying, mapping, and conserving Earth's living carbon reserves

Safeguarding carbon in ecosystems is essential to avoid a climate catastrophe, yet no study specifies the places that must be protected nor the priorities among them.

To address this gap, Conservation International launched an initiative to identify, map, and conserve Earth's living carbon reserves. Our initial analysis – published in *Nature Climate Change* – highlighted the critical importance of tropical peatlands, rainforests, mangroves, and other key ecosystems as reservoirs of 'irrecoverable carbon.' Our

comprehensive map reveals that **ecosystems store 139 gigatons of irrecoverable carbon globally, equivalent to 15 years of fossil fuel emissions**.

The next step for Conservation International: identifying the richest reservoirs of irrecoverable carbon at risk and mobilizing support to conserve these ecosystems. We aim to secure 20 gigatons of irrecoverable carbon, in ecosystems spanning 4 million km² globally, as a critical step in maintaining a stable, livable climate.

**Irrecoverable carbon in major ecosystems.**
Colors distinguish carbon in soil (brown) and biomass (green) pools. Irrecoverable carbon (dark brown, dark green) is shown separately from carbon that is not vulnerable (light grey) or vulnerable but recoverable (light brown, light green).

READ THE PUBLICATION

🔍 **Protecting irrecoverable carbon in Earth's ecosystems**

Source: Goldstein, et al. (2020) *Nature Climate Change.*

PRIORITIES
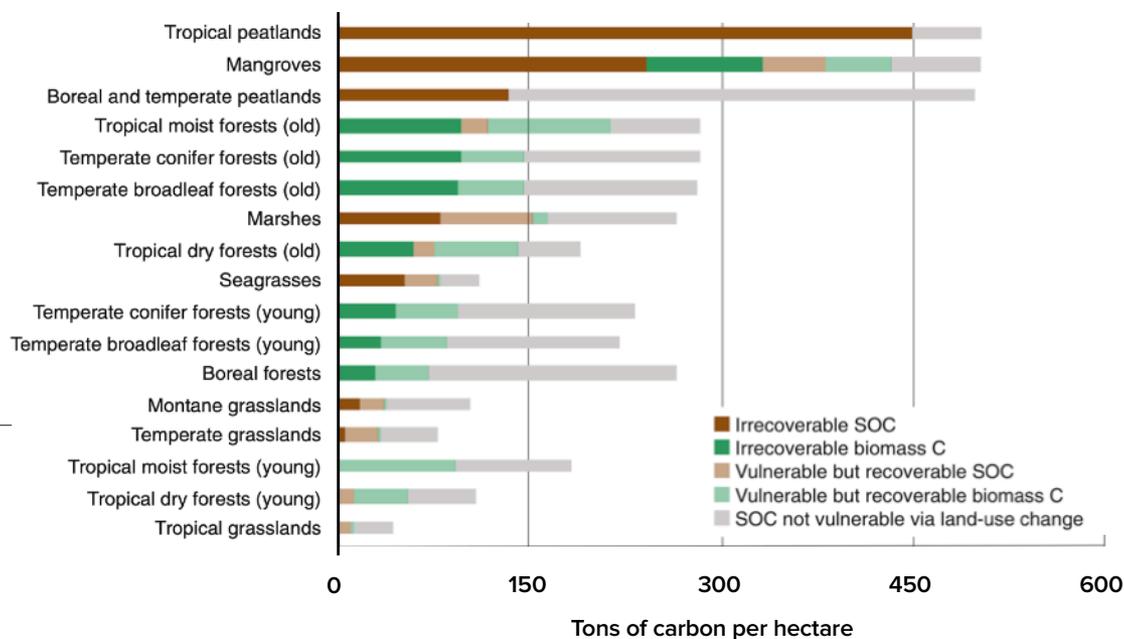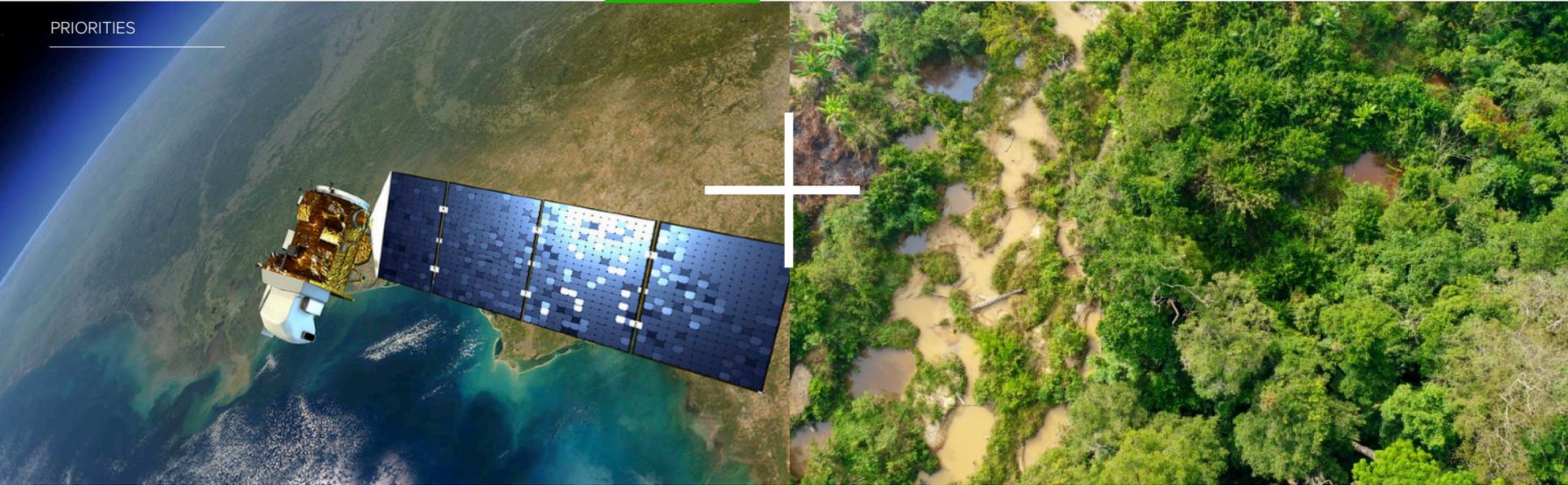
Natural Capital Accounting

Accounting for nature's contributions to sustainable development
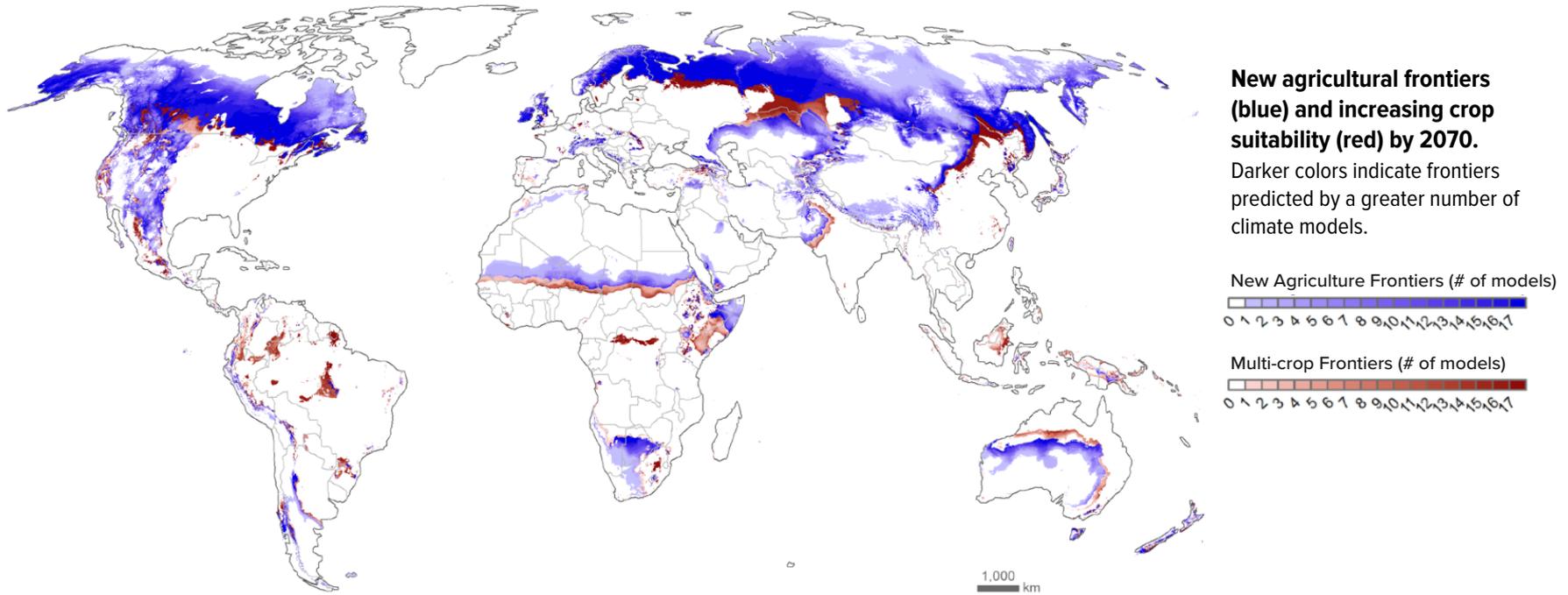
Natural capital assets – ecosystems that provide benefits to people – support economic development, yet existing accounting systems fail to track these assets alongside other national economic statistics.

Conservation International is spearheading international efforts to develop and mainstream a globally accepted framework for natural capital accounting. At our behest, the International Union for the Conservation of Nature overwhelmingly endorsed natural capital accounting as a critical mechanism for "measur[ing] the contribution of nature to the economy and livelihoods." At the national level, **in collaboration with the Liberian government and NASA researchers, we established an 'ecosystem extent account' for Liberia – an**

official account of the country's different ecosystem types and previously undocumented trends; this groundbreaking approach, replicated in Gabon and Botswana, is now ready for scaling globally.

We anticipate a major milestone in March 2021, with a decision by the UN Statistical Commission – guided by CI scientists and CI research – to establish the global statistical standard for natural capital accounting (i.e., the official framework by which governments will measure, monitor, and report the values of nature). By driving the establishment and adoption of these international standards, we aim to empower governments to better steward the world's $107 trillion in natural assets.

PHOTOS BY : NASA'S GODDARD SPACE FLIGHT CENTER   / TROND LARSEN

New agricultural frontiers (blue) and increasing crop suitability (red) by 2070. Darker colors indicate frontiers predicted by a greater number of climate models.

New Agriculture Frontiers (# of models)
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

Multi-crop Frontiers (# of models)
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

1,000 km

Agricultural Frontiers

Assessing the risks from climate-induced agricultural expansion

A Conservation International-led study published in *PLOS One* finds that **as climate change creates opportunities for agriculture at higher latitudes, land conversion could release 177 gigatons of CO_2 into the atmosphere — equivalent to over a century of U.S. carbon emissions.**

Rising temperatures will drive large-scale geographic shifts where food is grown, with significant implications for climate, water, and biodiversity. In particular, the vast areas in the high latitudes of Russia

and Canada that will become climatically suitable for agriculture also hold globally important stores of carbon and sources of freshwater. Planning for the potential northward shift of agricultural production is essential to conserve these ecosystems, which play a vital role in stabilizing the earth's climate. We are now integrating these insights into our efforts to conserve irrecoverable carbon in ecosystems, biodiversity, and other critical natural assets.

READ THE PUBLICATIONS

🔍 **The environmental consequences of climate-driven agricultural frontiers**

📖 **The full story**

Source: Hannah, et al. (2020) *PLOS One.*

STRATEGIES

HOW CAN WE BEST CONSERVE NATURE FOR PEOPLE?

To maintain nature for people, society deploys conservation initiatives in a range of contexts. Our research and decision-support tools empower governments, corporations, indigenous peoples, and other key decisionmakers to design tailored strategies that best conserve nature for people.

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PHOTO: © BENJAMIN DRUMMOND

STRATEGIES

Rollbacks to Nature Conservation

Assessing pandemic risks to catalyze post-pandemic opportunities

The COVID-19 pandemic represents an imminent threat to nature and its conservation globally, so Conservation International is aggressively working to raise awareness of these threats and ensure that pandemic policy responses catalyze nature conservation efforts.

We have accelerated and expanded our previous efforts to document and address legal rollbacks to environmental protections – a key threat to nature conservation that has persisted throughout the pandemic. In *Parks,* we co-authored an editorial emphasizing legal rollbacks as an emergent threat to protected and conserved areas and providing a vision for a sustainable recovery. **We launched a website to track legal rollbacks to conservation efforts, which we highlighted in an op-ed published in *Scientific American.*** As recognition of our thought leadership, we now co-chair a global task force charged with assessing the impacts of COVID-19 on conservation and providing guidance for global recovery efforts.
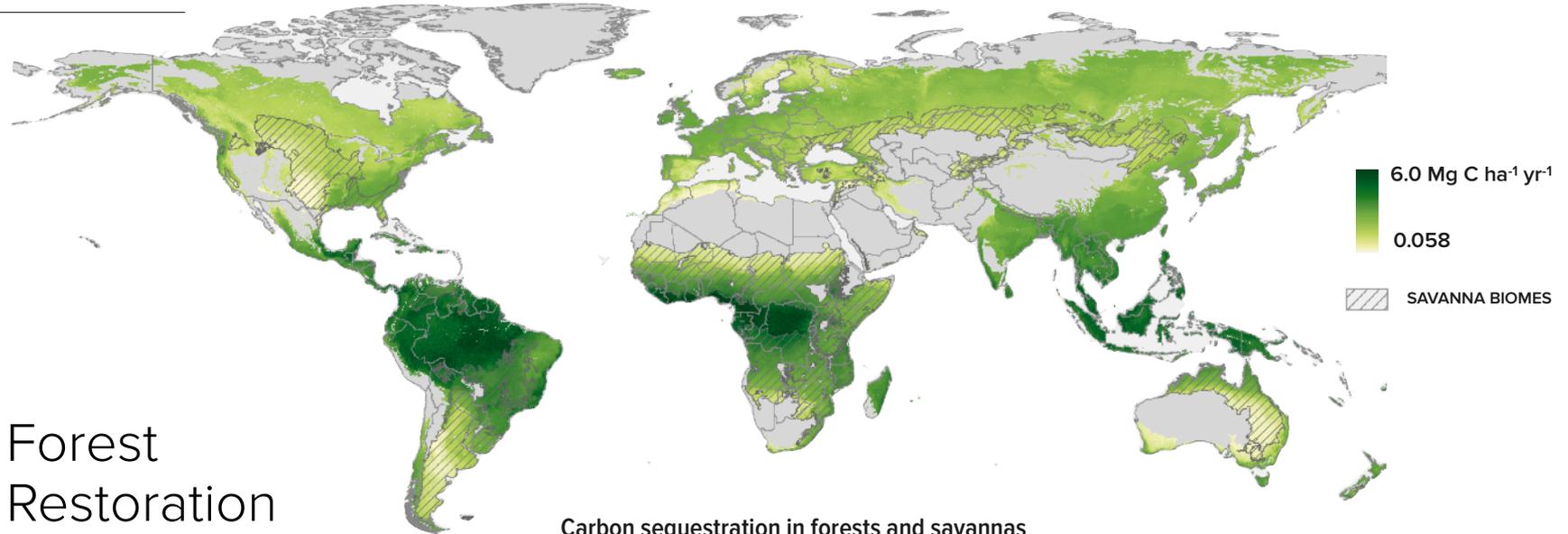
READ THE PUBLICATIONS

📖 **Rolling Back Environmental Protections under Cover of the Pandemic**

📖 **COVID-19 and Protected and Conserved Areas**

PHOTO: CONSERVATION INTERNATIONAL/AYA URAGUCHI

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STRATEGIES

6.0 Mg C ha^{-1} yr^{-1}

0.058

SAVANNA BIOMES

Forest Restoration

Mitigating climate change & conserving species

Carbon sequestration in forests and savannas

Predicted aboveground carbon accumulation rates (metric tons of carbon/hectare/year) in naturally regrowing forests in forest biomes (solid colors) and savanna biomes (hatched). NOTE: many savannas are not appropriate for forests; forest restoration should proceed with caution in these biomes.

Reforestation is critical to mitigating climate change, but key knowledge gaps prevent efficient development and scaling. Pioneering research by Conservation International is addressing these gaps.

In *Nature,* with our partners, **we produced the first fine-scale global map of forest carbon sequestration rates, pinpointing exactly which forest areas have the most potential to help humanity combat climate change.** We show that tropical forests regrow faster and capture significantly more carbon from the atmosphere than previously estimated, indicating that tropical forest restoration represents a bigger opportunity to mitigate climate change than recognized by the Intergovernmental Panel on Climate Change. In *Conservation Biology*, we report that reforestation also has tremendous potential to benefit threatened species: an area of more than 3.69 million km² has reforestation potential, with the greatest opportunities in Brazil and Indonesia.

Together with MasterCard, we are drawing upon these scientific insights to design an unprecedented global restoration initiative — growth of 100+ million trees by 2025.

READ THE PUBLICATIONS

Global reforestation and biodiversity conservation

Mapping carbon accumulation potential from global natural forest regrowth

Source: Cook-Patton, et al. (2020). *Nature*

STRATEGIES

Climate-Positive Supply Chains

Equipping companies and governments to meet global climate goals

Eliminating CO_2 emissions generated by agriculture is critical to meet global climate goals, yet governments and corporations struggle to deliver on their climate commitments.

Conservation International is pioneering a nature-based approach to 'climate-positive' supply chains that will catalyze corporate and governmental efforts. **With Walmart, the world's largest retailer, we piloted a first-of-its-kind supply chain assessment and identified real solutions that were foundational to Walmart's public commitment to protect and steward 50 million acres of land and 1 million square miles of ocean.** We subsequently launched the Fashion Pact — a parallel effort to establish science-based targets for "nature" for the fashion sector and deploy natural climate solutions to meet these targets.

By scaling these efforts, we expect to develop and catalyze widespread adoption of a nature-based solutions framework, spurring companies to remove 1 gigaton of CO_2 emissions from their agricultural commodity supply chains annually by 2025.

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© NEIL PALMER/CIAT   © BENJAMIN DRUMMOND

50M ACRES = 202,343 KM²
1M MI² = 2,589,988 KM²

IMPACTS

WHAT ARE THE IMPACTS OF CONSERVING NATURE?

Evidence on the effectiveness of conservation initiatives – what works and what does not – is essential to inform decisions, yet the impacts of most conservation initiatives are poorly understood. Our research on the social and ecological impacts of conservation catalyzes accountability, learning, and evidence-based policymaking for smarter and more impactful actions.

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PHOTO: CONSERVATION INTERNATIONAL /AYA URAGUCHI

IMPACTS

Impact Evaluation for Natural Climate Solutions

Spurring investment in nature to mitigate climate change

Though nature has the potential to deliver one-third of needed climate mitigation by 2030, nature-based approaches to mitigating climate change, i.e. natural climate solutions, receive less than three percent of global investments to address climate change. Rigorous evidence of the cost-effectiveness of natural climate solutions is required to de-risk investment and catalyze widespread adoption of these approaches.

To address this critical need, **Conservation International is developing a cutting-edge research initiative to generate the 'proof points' necessary to spur investment in evidence-based natural climate solutions.** In 2020, we wrapped up studies in Brazil and Peru and secured NASA funding for further research in Suriname and Guyana. Moreover, through our partnership with the Jameel Poverty Action Lab at MIT, we are mobilizing a global research network to focus its energies on the rigorous evaluation of natural climate solution initiatives.

In the coming years, these efforts will measure progress, foster learning, and ensure accountability in the fight against climate change. By 2025, our rigorous evaluations will reveal the most cost-effective natural climate solutions and drive $5 billion in investment to globally scale these approaches.
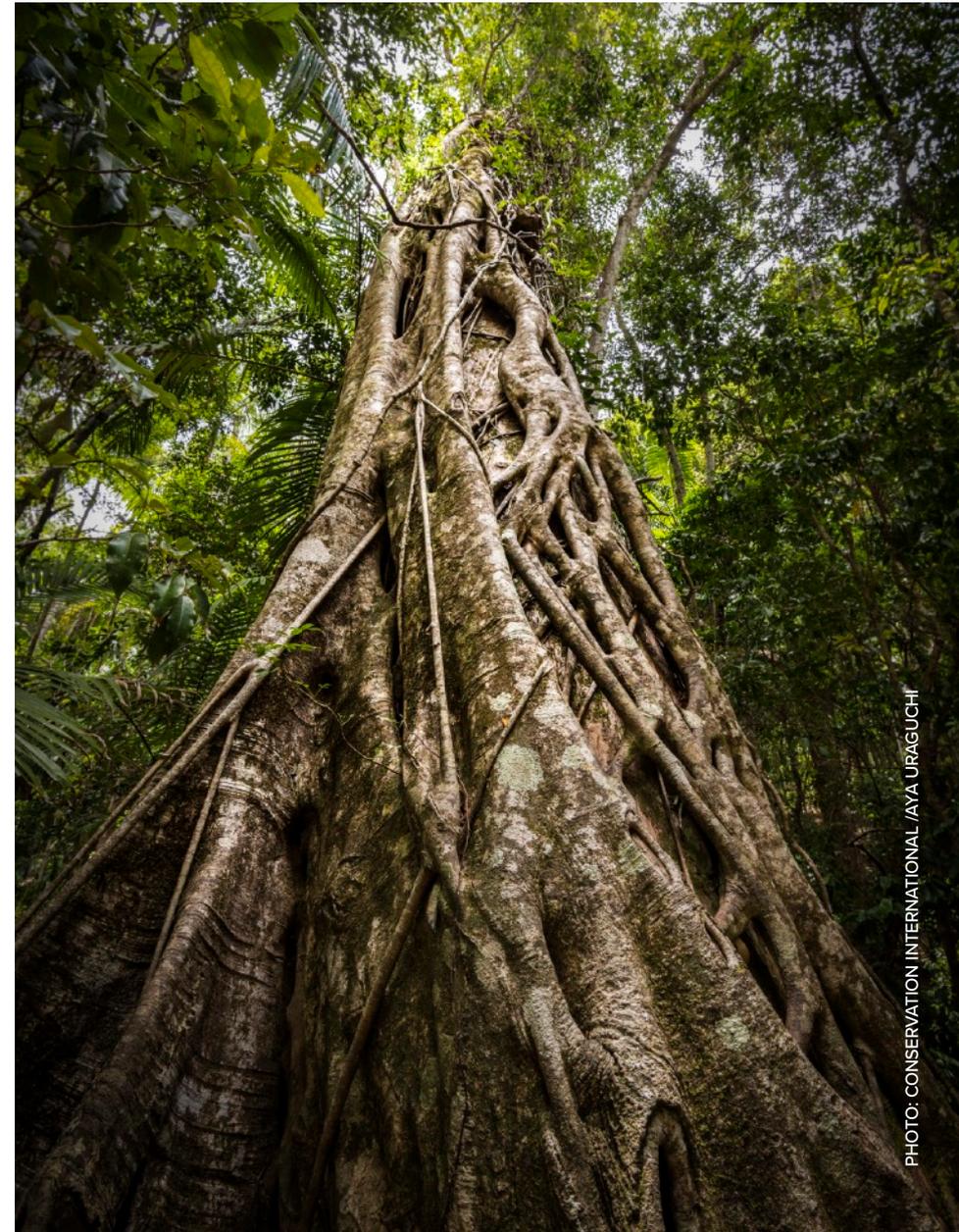
PHOTO: CONSERVATION INTERNATIONAL /AYA URAGUCHI

ON THE HORIZON

To remain agile and focused on the best opportunities for impact over time, we are committed to searching for and discovering new, innovative approaches to our work.

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Pandemic Prevention and Recovery

Conserving nature to protect human health

The COVID-19 pandemic is the latest in a series of disease outbreaks caused by viruses that jump from wildlife to humans, yet policymakers have traditionally ignored the potential for nature conservation to protect human health.

A landmark study from Conservation International scientists and partners, published in *Science*, demonstrates that **a $22–$30 billion/year global investment — reducing deforestation, regulating and enforcing wildlife trade laws, and containing viruses through early detection — could prevent future pandemics** for a tiny fraction of the estimated $5.6 trillion that COVID-19 will cost humanity.

In the U.S. and Europe, we are drawing on this critical scientific insight to guide policymakers to address deforestation and wildlife trade within pandemic prevention and recovery initiatives.

View Pandemic Infographic ➔

PHOTO: © ART WOLFE/WWW.ARTWOLFE.COM

Pandemic Prevention and Recovery

Investing **$260B** over 10 years would substantially reduce the risks of another pandemic on the scale of the coronavirus outbreak, saving millions of lives and preventing devastating economic costs.

READ THE PUBLICATIONS

📖 **The full story**

🔍 **Ecology and economics for pandemic prevention**

Human Health

2.4M 👩👨
lives saved

Economic ROI

$260B

Estimated spending needed over the next 10 years to prevent a future pandemic

VS

$5.6T
costs of COVID-19 to the world economy in 2020

Source: Dobson et al 2020 *Science*

Exponential Roadmap for Natural Climate Solutions

Mapping the pathways to a sustainable, stable, and just climate future

In 2020, research by Conservation International scientists and our partners quantified the critical role of ecosystems to present and future climate stability. Since 1900, terrestrial ecosystems that absorb and store carbon, known as 'carbon sinks', have reduced warming by at least 0.4°C (0.7°F). Without these carbon sinks, Earth would have already passed the 1.5°C (2.7°F) climate boundary.

These vast carbon sinks – if secured and enhanced through rapid implementation of natural climate solutions – can limit warming by an additional 0.3°C (0.5°F) by 2100. To guide this implementation, we are now developing an Exponential Roadmap for Natural Climate Solutions. **The Roadmap will catalyze exponential scaling of conservation and restoration actions needed to limit warming below 2°C (3.6°F)**, as specified in the Paris Agreement, which may require game-changing innovations in technology, policy, and social change.
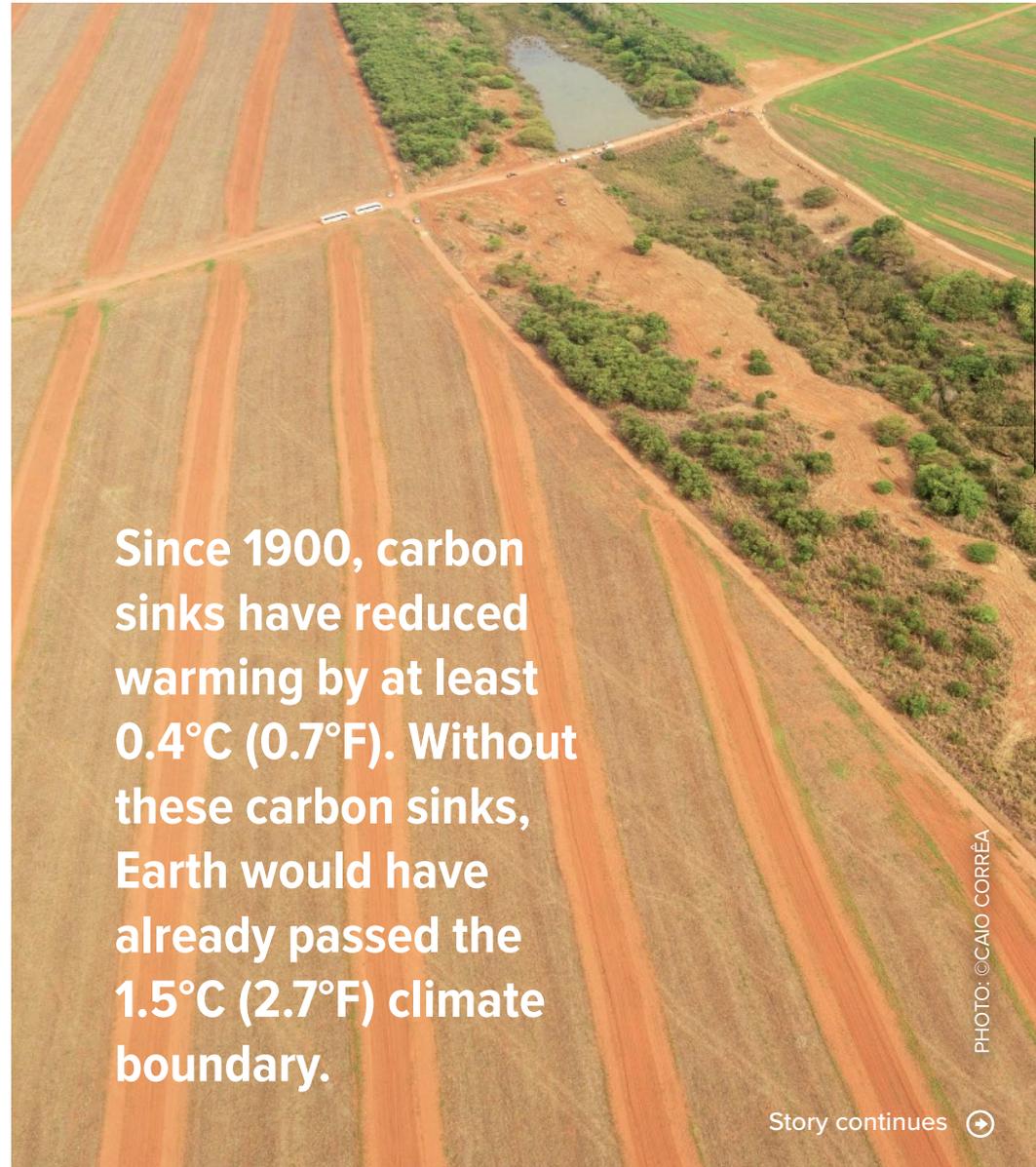
Since 1900, carbon sinks have reduced warming by at least 0.4°C (0.7°F). Without these carbon sinks, Earth would have already passed the 1.5°C (2.7°F) climate boundary.

PHOTO: ©CAIO CORRÊA

Story continues ➡

Full implementation of natural climate solutions – the actions that conserve, restore, or sustainably manage ecosystems and working lands – would limit warming by an additional 0.3°C (0.5°F) by 2100.

The Roadmap identifies seven key groups of actors and actions needed to deliver climate mitigation outcomes from nature. For each of these seven 'pathways', we estimate climate mitigation potential beyond business-as-usual based on two scenarios: (i) anticipated ambitious actions, which assumes successful implementation and scaling of previously announced or regionally demonstrated initiatives, and (ii) needed transformational actions to limit global warming well below 2°C (3.6°F). Where these two scenarios differ or converge, the Roadmap will clarify the need to drive forward existing efforts or invest in new approaches.

We will showcase this first-of-its-kind Roadmap at key events throughout 2021 (e.g., "Our Planet, Our Future" Nobel Summit) to generate support and momentum for adoption of the Roadmap's recommendations by Parties to the UN Framework Convention on Climate Change in Glasgow (December 2021).

The Roadmap is now possible because of a breakthrough study, which we published earlier this year in *Philosophical Transactions of the Royal Society B*, that demonstrates the global climate mitigation potential of natural climate solutions across a range of ecosystems.

READ THE PUBLICATION

National mitigation potential from natural climate solutions in the tropics

Conservation breakthroughs via Technology

Emerging technologies are rapidly transforming our society and our planet, yet the conservation community has traditionally been slow to integrate cutting-edge technology into policy and practice. Building on a history of novel conservation technology development and applications, Conservation International redoubled our focus on conservation technology in 2020.

1

We consolidated our team of conservation technology experts within the Moore Center for Science and grew our ranks with the arrival of Evan Rapoport, CI Senior Technology Fellow and a veteran of Google X.

2

We dramatically expanded the capabilities of Wildlife Insights, our award-winning artificial intelligence application for near-real-time wildlife monitoring, and secured our first paying client.

3

We launched a structured process for horizon scanning and initiated the development of an organizational strategy for conservation technology.

4

We secured $500,000 to develop more inclusive conservation technologies, allowing us to build novel functions into our existing technology portfolio and to construct a vision and roadmap for the future.

PUBLICATIONS & MEDIA HIGHLIGHTS

BREAKTHROUGHS 2020

PHOTO: © BENJAMIN DRUMMOND

Publications in 2020

The Moore Center for Science at Conservation International is one of the world's premier conservation research units. We continue to publish breakthrough research and grow the body of evidence upon which humanity depends. To date, Conservation International has published more than 1,100 peer-reviewed articles, many in leading journals like *Science*, *Nature*, and the *Proceedings of the National Academy of Sciences*.

On average, each of our scientific papers is cited more than 45 times by other scholars – more than any other U.S. conservation organization and leading universities like Harvard, Yale, Duke, and Stanford.

38 PEER-REVIEWED PUBLICATIONS RELEASED

40 MANUSCRIPTS CURRENTLY IN REVIEW

268 HEADLINES
FROM TOP-TIER MEDIA OUTLETS ON CI RESEARCH, INCLUDING THE GUARDIAN, BLOOMBERG, AND FAST COMPANY.

24+ MILLION PEOPLE REACHED
ON SOCIAL MEDIA INCLUDING TWITTER, FACEBOOK AND LINKEDIN

268 HEADLINES

FROM TOP-TIER MEDIA OUTLETS ON CI RESEARCH, INCLUDING THE GUARDIAN, BLOOMBERG, SCIENTIFIC AMERICAN, AND FAST COMPANY.

The Guardian
Cost of preventing next pandemic 'equal to just 2% of Covid-19 economic damage'

The New York Times
A Fact-Checked List of Trump Accomplishments

Bloomberg Green
Want to Stop the Next Pandemic? Start Protecting Wildlife Habitats

POPULAR SCIENCE
Protecting nature could prevent the next pandemic

AXIOS
How climate change and wildlife influence the coronavirus

FAST COMPANY
The planet is full of land holding 'irrecoverable carbon'—and it's at risk

SCIENTIFIC AMERICAN
The Carbon We Can't Afford to Lose

the japan times
Climate change to open up 'frontier' farmland, but experts urge caution

Publications

NOTE: NAMES IN **BOLD** ARE CI AUTHORS

A boost for freshwater conservation: Integrating freshwater and terrestrial conservation planning has high returns
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Mahajan, S.L., **A. Jagadish**, L. Glew, G. Ahmadia, H. Becker, R.Y. Fidler, L. Jeha, M. Mills, C. Cox, N. DeMello, A.R. Harborne, Y.J. Masuda, M.C. McKinnon, M. Painter, D. Wilkie, **M.B. Mascia**. 2020. *Conservation Science and Practice*. e299. https://doi.org/10.1111/csp2.299

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Vollmer, D., M.O. Bezerra, N.A. Martínez, O.R. Ortiz, **I. Encomenderos, M.C. Marques**, L. Serrano-Durán, I. Fauconnier, R. Yu Wang. 2020. *Ambio*. https://doi.org/10.1007/s13280-020-01407-8

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