

A Global Baseline of Carbon Storage in Collective Lands

INDIGENOUS AND LOCAL COMMUNITY CONTRIBUTIONS
TO CLIMATE CHANGE MITIGATION

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Forests and other lands are essential for achieving climate and development ambitions. If appropriately leveraged, natural climate solutions can contribute upwards of 37 percent of cost-effective CO₂ mitigation by 2030,¹ and evidence shows Indigenous Peoples and local communities are key to achieving such outcomes.

This report presents the most comprehensive assessment to date of carbon storage in documented community lands worldwide.

Key Findings

Drawing on newly developed global estimates of carbon density for aboveground and belowground woody biomass and associated soils, analysis of the most recent available forest tenure data from 64 countries (accounting for 69% of the world's forest cover) shows that, at a minimum:

- 1. Indigenous Peoples and local communities manage at least 17 percent, or 293,061 million metric tons (Mt) of the total carbon stored in the forestlands of assessed countries**—a global estimate that is 5 times greater than shown in a previous analysis of aboveground tropical forest carbon,² equivalent to 33 times the global energy emissions of 2017.³
- 2. Twenty two percent (217,991 MtC) of the forest carbon found in the 52 tropical and subtropical countries⁴ in this analysis is stewarded by communities, and one-third of this (72,079 MtC) is located in areas where Indigenous Peoples and local communities lack formal recognition of their tenure rights**—putting them, their lands, and the carbon stored therein at risk.
- 3. Soil organic carbon accounts for almost 65 percent (113,218 Mt) and nearly 90 percent (105,606 Mt) of the total forest carbon managed by communities in tropical and non-tropical forest countries,⁵ respectively.** By protecting their forests and lands, communities are not only maintaining the carbon stored in the trees (above and below ground), but are also in effect protecting vast reservoirs of carbon that would otherwise be released to the atmosphere if the overlying forests were destroyed.
- 4. Carbon storage in collective lands is far greater and more extensive than what can be assessed through available data.** This assessment remains an underestimate of carbon stored in collective forestlands worldwide. The full extent of forests and other lands held by indigenous and local communities—and particularly those where communities have yet to achieve legal recognition of their rights—is unknown and spatially explicit data concerning these areas remains lacking. Thus, vast stores of carbon within collective lands in carbon-rich countries such as Indonesia and the Democratic Republic of the Congo remain undocumented.



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This product was developed in close collaboration with the Indigenous Peoples Alliance of the Archipelago (AMAN), the Mesoamerican Alliance of Indigenous Peoples and Forests (AMPB), and the Coordinators of the Indigenous Organizations of the Amazon Basin (COICA). It is endorsed by the Association for Indigenous Women and Peoples of Chad (AFPAT) and the Indigenous Peoples of Africa Co-ordinating Committee (IPACC).

Opportunities and Challenges

The international community urgently needs to reduce deforestation and forest degradation pressures, and enhance the sustainable use, conservation, and restoration of vital ecosystems. However, evidence to date shows that those closest and most ably positioned to manage the Earth's carbon-rich lands—most notably Indigenous Peoples and local communities—have yet to be made part of emerging national and global climate solutions. Indigenous Peoples' and local communities' lands have not been fully recognized nor provided adequate climate funding, reducing their ability to fulfill their maximum potential as a climate solution.

Up to 2.5 billion people make their living in rural economies through the stewardship of community forests and other community lands that play an essential role in maintaining ecosystem services at the landscape level. Compared with other regime types, communities with secure tenure tend to experience lower rates of deforestation and forest carbon emissions and maintain higher levels of biodiversity that produce more resilient landscapes.⁶ Secure community land rights are vital to the eradication of poverty and food insecurity, the advancement of gender justice, and efforts to address inequality and tenure-related conflicts.⁷

Unfortunately, the ability of Indigenous Peoples and local communities to pursue locally adapted livelihoods and protect globally important ecosystems continues to be thwarted by limited recognition of their tenure rights. Despite holding rights to more than half of the world's land mass, Indigenous Peoples and local communities legally own only 10 percent of global lands.⁸ Similarly, according to the latest assessment of 58 countries encompassing nearly 92 percent of the global forest estate, progress toward the legal recognition of community forest tenure rights is wholly inadequate, amounting to just over 14 percent of forest area as of 2017.⁹ As a result, communities face increasing threats of criminalization and violence from the continued expanse of externally driven land-use schemes that fail to recognize the tenure rights of communities or effectively and openly seek their free, prior, and informed consent.¹⁰

Figure 1

At least 293,061 million metric tons of carbon (MtC) are stored in the collective forestlands of Indigenous Peoples and local communities.
« This is equivalent to 33 times global energy emissions in 2017 »

Map of 64 Countries Analyzed Across 4 Biomes (Tropical, Subtropical, Temperate, and Boreal Forests) *

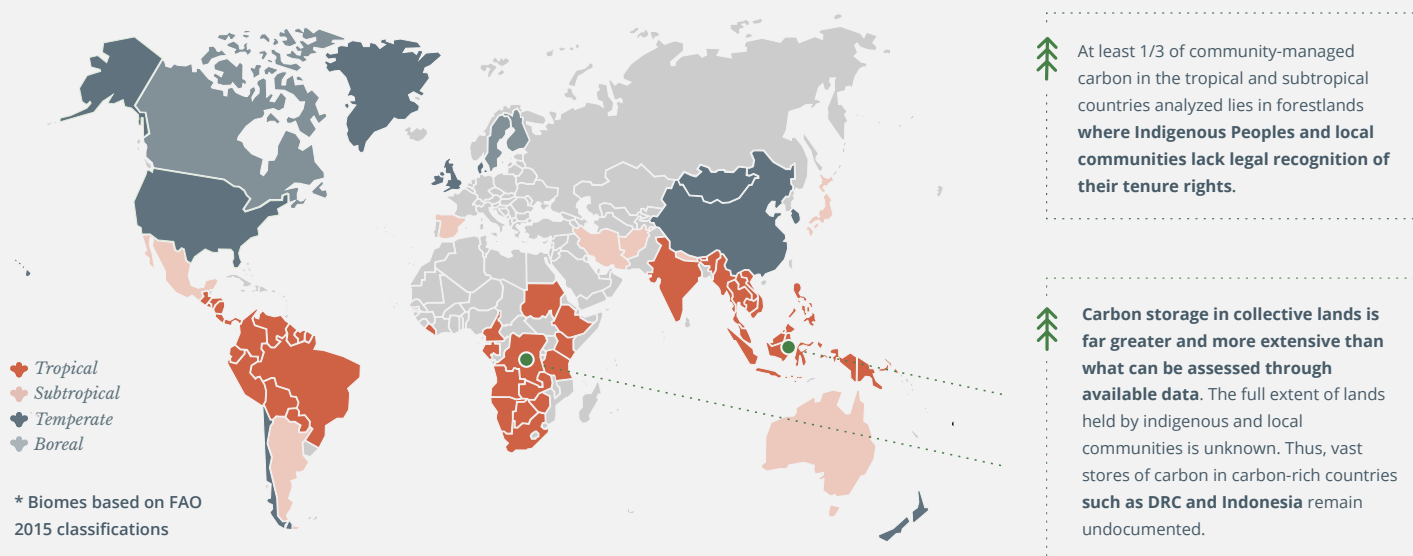
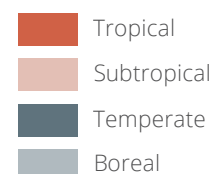


Figure 2

Carbon storage in forests collectively held by Indigenous Peoples and local communities, by country

Note: Countries are listed in descending order of total carbon stored in forests held by Indigenous Peoples and local communities.



Country	Aboveground and Belowground Carbon Stored in Legally Owned or Designated Collective Forestlands (Mt)	Aboveground and Belowground Carbon Stored in Collectively Held but not Legally Recognized Forestlands (Mt)	Soil Organic Carbon Stored in Legally Owned or Designated Collective Forestlands (Mt)	Soil Organic Carbon Stored in Collectively Held but not Legally Recognized Forestlands (Mt)
Brazil	17424	-	21891	-
China	4016	-	33238	-
Australia	1060	1831	8510	13197
Democratic Republic of the Congo	43	9076	34	9907
Mexico	2837	-	13643	-
Colombia	5486	-	9549	-
Papua New Guinea	4596	-	10439	-
United States of America	1258	117	11900	1061
Canada	643	-	13551	-
Venezuela	172	4322	241	6898
Peru	2947	982	6381	1321
Zambia	3679	-	7208	-
India	31	1098	178	6393
Greenland	-	276	-	5329
Bolivia	1495	542	2337	1174
Tanzania	1351	-	4196	-
Indonesia	-	1444	-	3993
Ecuador	1169	21	2189	53
South Africa	481	-	2557	-
Botswana	90	65	1588	839
Guatemala	-	447	-	1871
Suriname	-	1021	-	1133
Zimbabwe	322	-	1733	-
Philippines	542	-	1317	-
Mongolia	35	-	1615	-
Nicaragua	-	361	-	1120
Panama	209	178	495	501
Honduras	-	281	-	1043
Namibia	92	-	1021	-
Guyana	462	-	609	-
Cameroon	385	-	580	-
Nepal	192	-	594	-

	Tropical	(continued)		
	Subtropical			
	Temperate			
	Boreal			
Country	Aboveground and Belowground Carbon Stored in Legally Owned or Designated Collective Forestlands (Mt)	Aboveground and Belowground Carbon Stored in Collectively Held but not Legally Recognized Forestlands (Mt)	Soil Organic Carbon Stored in Legally Owned or Designated Collective Forestlands (Mt)	Soil Organic Carbon Stored in Collectively Held but not Legally Recognized Forestlands (Mt)
Iran	63	-	631	-
Sweden	38	-	585	-
Kenya	41	-	539	-
New Zealand	77	-	502	-
Costa Rica	43	48	146	172
Malaysia	-	129	-	255
Vietnam	96	-	282	-
French Guiana (France)	150	-	154	-
Chile	28	-	266	-
Ireland	10	-	244	-
Spain	43	-	196	-
Belize	-	57	-	167
Paraguay	49	-	151	-
England (United Kingdom)	11	-	183	-
Liberia	82	-	105	-
Argentina	12	-	155	-
Japan	25	-	123	-
El Salvador	-	33	-	107
Thailand	31	-	86	-
Cambodia	33	-	76	-
Finland	4	-	81	-
Ethiopia	6	-	51	-
Myanmar	15	-	40	-
Bhutan	13	-	37	-
Gabon	13	-	18	-
Sudan	0.24	-	29	-
Gambia	1	-	7	-
Lao PDR	2	-	4	-
Antigua and Barbuda	1	-	3	-
South Korea	0.34	-	1	-
Afghanistan	-	0.002	-	0.15
Angola	0.04	-	0.07	-
Total	51908	22330	162291	56533

An Innovative Partnership and Research Agenda

This report builds on an expanding partnership among indigenous- and community-based organizations, scientists, and policy experts. In addition to documenting the scale and significance of community-managed terrestrial greenhouse gas sinks and reservoirs across the world, the partnership aims to draw global attention to the importance of securing community land and resource rights, and to making Indigenous Peoples, local communities, and indigenous and rural women part of emerging climate and development solutions.

Spearheaded in 2014¹¹ by a joint collaboration of the Coordinators of the Indigenous Organizations of the Amazon Basin (COICA), Woods Hole Research Center (WHRC), the Amazon Geo-Referenced Socio-Environmental Information Network (RAISG), and the Environmental Defense Fund (EDF), subsequent analyses in 2015¹² and 2016¹³ broadened the partnership to include the Mesoamerican Alliance of Indigenous Peoples and Forests (AMPB), the Network of Indigenous Peoples and Local Communities for the Sustainable Management of Forest Ecosystems in Central Africa (REPALAC), the Indigenous Peoples Alliance of the Archipelago (AMAN), the Rights and Resources Initiative (RRI), and the World Resource Institute (WRI).

Using forest tenure data from RRI, WRI, and participating NGOs, previous research grounded in aboveground carbon density estimates from circa 2007 revealed that documented indigenous and community forestlands in the pantropical region (37 countries) accounted for at least 24 percent (54,546 Mt) of the total carbon stored aboveground in the world's tropical forests.¹⁴

Breaking New Ground

By contrast, this study combines more recent data points, more climatic zones, and more carbon stocks, showing that Indigenous Peoples and local communities manage 5 times more carbon than previously acknowledged using aboveground tropical forest carbon data only. Specifically, it presents the first global baseline assessment of carbon stocks found above and below ground, as well as in the soil organic matter of community-managed lands across tropical, subtropical, temperate, and boreal zones. It relies on newly generated global carbon density data from WHRC, updated forest tenure data from RRI, spatially explicit land tenure data from LandMark, and recently produced spatial data from an ongoing collaboration with AMAN to create the most current and accurate assessment of carbon stored in indigenous and local community lands and forests.

Linking Data to Action

Research conducted to date suggests that international efforts to meet the goals of the Paris Agreement and the 2030 Agenda for Sustainable Development are unlikely to be achieved if the collective tenure rights of Indigenous Peoples and local communities are not secured.¹⁵ As the principle stewards of some of the most biodiverse and carbon-rich ecosystems on Earth, Indigenous Peoples and local communities play an essential role in the management and protection of carbon-rich lands and forests. In the absence of concerted efforts to legally secure their rights and strengthen community access to technical and financial resource flows, the ability of indigenous and local communities to maintain these vital systems is at risk. As part of countries' commitments to uphold engagement with the Local Communities and Indigenous Peoples Platform in the context of climate discussions under the United Nations Framework Convention on Climate Change (UNFCCC), countries should likewise prioritize national actions and investments that recognize and leverage community-based solutions to land and forest conservation in the context of Nationally Determined Contributions (NDCs).

Building on the growing body of evidence supporting this analysis, the indigenous and community alliances supporting this initiative call on individual governments, the international community, and investors and corporations to:

- 1. Significantly scale up recognition of community-based tenure—with a particular focus on recognizing Indigenous Peoples and local communities as owners of their lands and forests**—by increasing support to low- and middle-income countries and civil society organizations to implement existing laws and reform processes, and further the advancement of progressive legislation in the context of climate and development commitments, such as REDD+ and the Sustainable Development Goals (SDGs).

2. **Secure the free, prior, and informed consent (FPIC) of Indigenous Peoples, local communities, and rural and indigenous women** as part of a continuous cycle of engagement among corporations, investors, governments, and development institutions.
3. **Improve and continuously expand Indigenous Peoples' and local communities' access to critical knowledge** to strengthen their advocacy needs and support the sustainable development and climate resilience of communities.
4. **Prioritize bilateral and multilateral investments in indigenous- and community-led initiatives** associated with global efforts to reduce emissions from deforestation and forest/land degradation, strengthen community-based conservation and restoration efforts, and improve sustainable forest/land use opportunities.
5. **End the criminalization and persecution of Indigenous Peoples and local communities** defending their lands, forests, and natural resources.

Methods

The analysis estimated carbon storage in aboveground live dry woody biomass, belowground live dry woody biomass, and soil organic matter in the collective lands of the 64 countries listed in Figure 2 using available spatial and non-spatial data sources. Geographic Information System (GIS)-compatible polygons (file geodatabase format) delineating the boundaries of collective lands were used for 40 of the 64 countries.

The authors relied on publicly available georeferenced tenure data from LandMark: The Global Platform of Indigenous and Community Lands for 36 of these countries with additional georeferenced data provided by AMAN, the International Union for Conservation of Nature (IUCN), and Moabi. Georeferenced community boundaries were combined with carbon density¹⁶ data via the R statistical software package and analyzed using a vector-based approach. In the case of Indonesia, available georeferenced community boundaries (polygons) were combined with carbon density data via a GIS (ArcGIS 10) and analyzed by AMAN technical staff using a raster-based approach.

Countries analyzed spatially include: Afghanistan, Antigua and Barbuda, Australia, Belize, Bolivia, Botswana, Brazil, Canada, Chile, Colombia, Costa Rica, Democratic Republic of the Congo, Ecuador, El Salvador, French Guiana, Greenland, Guatemala, Guyana, Honduras, Indonesia, Iran, Ireland, Kenya, Malaysia, Mexico, Namibia, New Zealand, Nicaragua, Panama, Paraguay, Peru, Philippines, South Africa, Spain, Suriname, England (United Kingdom), United States of America, Venezuela, Zambia, and Zimbabwe. Data for these countries is considered current and inclusive of documented collective lands for legally and non-legally recognized areas.

Nevertheless, significant gaps in data and coverage remain. For example, the results reported in this analysis for Indonesia alone potentially account for less than half of the carbon held in community forests and other lands. Efforts will be undertaken in the future (annually or as resources allow) to revise the estimates contained herein as new information becomes available worldwide. For countries lacking spatially-explicit tenure data, the study incorporated area-based statutory forest tenure data from RRI's recently updated global forest tenure database which includes 58 countries covering nearly 92 percent of the world's forests as of 2017.¹⁷ For these countries, carbon storage was quantified by

Soil Organic Carbon Throughout Indigenous and Community Lands

In addition to calculating the carbon stored aboveground, belowground, and in the soil organic matter within Indigenous Peoples' and local communities' forests, this analysis also addresses the contribution of soil organic matter to carbon stored in community lands outside of forests. Across 39 countries where geospatial data on community lands are available, this analysis finds that upwards of 69,055 Mt of carbon is stored in the soils of grasslands, peatlands, and other terrestrial ecosystems both managed and protected by Indigenous Peoples and local communities. The vast stores of soil organic carbon found across this limited sample of community lands demonstrate the immense importance of these nonforested ecosystems to land carbon sequestration.

multiplying known area estimates for collective forestlands by national averages of carbon density. Political-administrative layers were used to determine national averages of carbon density.

This method was used for Angola, Argentina, Bhutan, Cambodia, Cameroon, China, Ethiopia, Finland, Gabon, Gambia, India, Japan, Lao PDR, Liberia, Mongolia, Myanmar, Nepal, Papua New Guinea, South Korea, Sudan, Sweden, Tanzania, Thailand, and Vietnam. Additional data were obtained for collective forestlands in India estimated to be eligible for community forest rights recognition (but not yet recognized) under the Forest Rights Act of 2006.

All results in this analysis represent a minimum baseline estimate of the carbon held in collective forestlands. Actual contributions of Indigenous Peoples and local communities are likely to be much higher, and the results of this assessment will be revised as new spatial and non-spatial data concerning both areas legally recognized as designated for and owned by Indigenous Peoples and local communities, as well as collectively held areas which have not yet been legally recognized, become available.

Aboveground carbon density was estimated by WHRC using field measurements together with information from Earth observation satellites and ancillary climate and soil data.¹⁸ The result (unpublished) was a globally continuous map-based estimate of the amount and distribution of carbon stored aboveground in the live dry woody biomass (leaves, branches, stems) of Earth's vegetation for the 2016 timeframe at a spatial resolution averaging 500 meters.¹⁹

Belowground carbon density was estimated by applying published biome-level or ecoregion-level root:shoot ratios to the map of aboveground carbon density.²⁰ The result (unpublished) was a map-based estimate of the amount and distribution of carbon stored belowground in the live dry woody biomass (roots) of Earth's vegetation for the 2016 timeframe at a spatial resolution of approximately 500 meters. Soil organic matter was estimated by WHRC using field measurements together with information on land use, climatic, topographic, geologic, and landform characteristics. The result was a map-based estimate of the amount and distribution of carbon stored in the organic matter of Earth's soil above a depth of 2 meters for the 2010 timeframe at a spatial resolution of 10 kilometers (resampled to ca. 500 meters for consistency).²¹

Endnotes

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About the Rights and Resources Initiative

The Rights and Resources Initiative (RRI) is a global coalition consisting of 15 Partners, 7 Affiliated Networks, 14 International Fellows, and more than 150 collaborating international, regional, and community organizations dedicated to advancing the forestland and resource rights of Indigenous Peoples and local communities. RRI leverages the capacity and expertise of coalition members to promote secure local land and resource rights and catalyze progressive policy and market reforms.

RRI is coordinated by the Rights and Resources Group, a non-profit organization based in Washington, DC. For more information, please visit www.rightsandresources.org.



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