Rainforest Foundation Norway

State of the tropical rainforest

The complete overview of the tropical rainforest, past and present.

Rainforest Foundation Norway is one of the world's leading organisations in the field of rights-based rainforest protection. We are working for a world where the environment is protected and human rights are fulfilled.

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State of the tropical rainforest
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Introduction

This report is the first in the world of its kind. Granted, there has been scattered research on the state and extension of the tropical rainforest. However, that research has often applied varying methodologies and they are not always comparable, nor do they necessary present the latest data or use the same reference year. This has made it impossible to monitor the global state and historical development of the tropical rainforest in an easy and reliable manner.

Why is this important? Simply put because the tropical rainforest is arguably the most important terrestrial ecosystem on the planet. It provides a wide range of invaluable ecosystem services for all life on Earth. Yet available data on the state of this particular tropical forest type has been surprisingly inadequate. Along with a scarcity of global biome specific forest data, misconceptions about tropical rainforests flourish. This confuses the public discourse on tropical rainforest, and at worst it could mislead policy makers and policy influencers about the true state of this unique ecosystem.

The world cannot afford that. We need the debate over how to save the rest of the tropical rainforests to be founded on reliable data on the condition of these forests. “One third” is a key takeaway from this report:

- One third of the original tropical rainforest is gone.
- One third of the original tropical rainforest is degraded.
- One third of the original tropical rainforest is still intact.

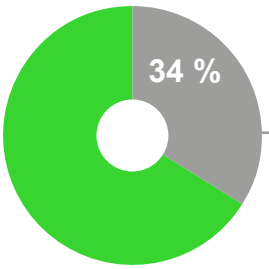
There are both positive and alarming angles to take from these simple facts. It’s positive that we have not cleared half of the world’s tropical rainforest, a common statement found on various credible web sites. It’s alarming that only one third is left intact given that degraded forests often struggle to sustain themselves.

This report is the first complete overview of the state of the world’s tropical rainforest at present and in a historical perspective. It aims to fill a critical knowledge gap in the effort to preserve these invaluable forests for future generations.

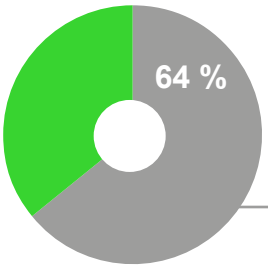
Original
Tropical rainforest cover
(all forest intact)[1]
14 580 513 km²

2019
Tropical rainforest cover
9 538 022 km²

2016
Intact tropical rainforest
5 247 415 km²

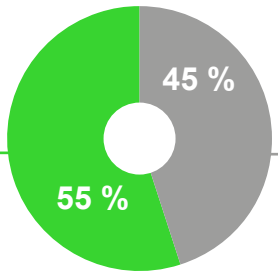


Total deforestation
5 042 491 km²



Total deforestation and degradation
9 333 098 km²

Intact tropical rainforest
5 247 415 km²



Degraded tropical rainforest
4 290 607 km²

Current rainforest cover (2019)

*All figures are referring to canopy cover of 30 % or more. See method chapter at page 22 for more details.

The tropical rainforest

Photo: Thomas Marent

The tropical rainforest is a unique ecosystem in particularly three significant ways:

- It covers only 6,5 % of the Earth's terrestrial surface, yet holds more than half of the world's biological diversity.[2] No other ecosystem on Earth can match the biological diversity of this forest.
- It stores more carbon in live biomass than any other ecosystem on the planet.[3] Thus, stopping the deforestation and degradation of tropical rainforests is key to be able to slow the human caused warming of Earth's oceans and atmosphere.
- It cools the air and creates evaporation more effectively than open water. It creates what has been termed the "biotic pump", which secures rainfall thousands of kilometres inland from the oceans[4]. It affects precipitation patterns all over the world[5].

Defining tropical rainforests

Precipitation

There is no straightforward definition of a tropical rainforest. In terms of precipitation, some can receive more than 9 meters of rainfall annually, with little seasonal differences, like the Choco-Darien rainforest along the northern Pacific coast of South America[6]. The forests in the tropics that receive more than 2,5 meters of rainfall per year with little seasonal variations are growing in a climate

that deterministically supports rainforests. This means that the climate is the main driving force of the kind of ecosystem that develops. In such a climatological climax for a tropical rainforest, no other ecosystem will naturally grow[7]. This kind of rainforest climate is mainly found in interior parts of the Amazon and in Southeast Asia.

Other tropical rainforests can receive as little as 1,5 meters of rainfall a year, with a dry season that can last 3-5 months. The drier months are not rain free, but they receive significantly less rainfall than other months. These are tropical semi-evergreen rainforests, where some trees can shed the leaves during a short period of the dry season to conserve energy. This is a climate zone that also supports savannas. In this climate zone, the establishment of fire prone grasses strongly determines the establishment of a forest or savanna environment. Light-dependant fire prone grasses sustain the regular fires of the savannas. In contrast to savannas, rainforests do not consist of fire adapted plants and trees. Due to the lack of sufficient sunlight, the closed canopy of a rainforest does not allow for fire prone grasses to grow[8]. The forest also holds moisture well, so when the fires of the savannas reach the edge of intact rainforests, they die out.

This can create sharp borders between rainforest and savanna, with no transitional ecosystem between them. These are called forest-savanna mosaics and cover large areas of especially Amazonia and equatorial Africa[9]. Almost the entire Central African rainforest grows in this climate zone. The Yucatan rainforest in Mexico, Guatemala and Belize, and much of mainland Asia's rainforest also grow in this forest-savanna climate[10]. Over thousands of years, there is a slow back and forth struggle between forests and savannas in these areas, driven by many different factors[11], though large blocks of rainforests have remained relatively stable over time. Today, humans degrade enormous rainforest areas each year so that the tropical rainforests become drier and lose the ability to withstand fires[12]. If conditions change significantly, the forest ecosystem can collapse and transition to savanna. Thousands of kilometres of degraded rainforest burn every year due to human caused forest degradation, and human induced fires[13].

◂◂ This wet and frost-free climate allows plants to continually grow throughout the year without periods of energy conservation due to frost or drought. ▸▸

In some areas, the soil and climatological conditions create transitional forests between rainforests and dry savannas. These are called everything from tropical dry forests or tropical monsoon forests, to seasonal tropical forests and tropical moist deciduous forests. This forest type has a prolonged and distinct dry season during which many of the trees shed their leaves[14]. They tend to flank the rainforest to the north or south. Even though many of these transitional forests can have a dense canopy much of the year and consist of broad-leaved trees, due to the drier climate and prolonged dry season, the trees have a lower stature than those of the rainforest. These forests also consist of fewer plant and animal species, and they store less carbon in live biomass[15]. They can, however, have high endemic species composition. These forests can consist of a certain amount of fire adapted tree species, making them more adapted to fires than a rainforest environment[16]. However, this fire adaptability varies, even within the same forest area, and none can withstand fires of high intensity and durability[17]. Not all tropical dry or monsoon forests are transitional forests. The largest tropical dry forest in the world, which also is a transitional forest, is the Chiquitano forest in Bolivia and Brazil[18].

Temperature

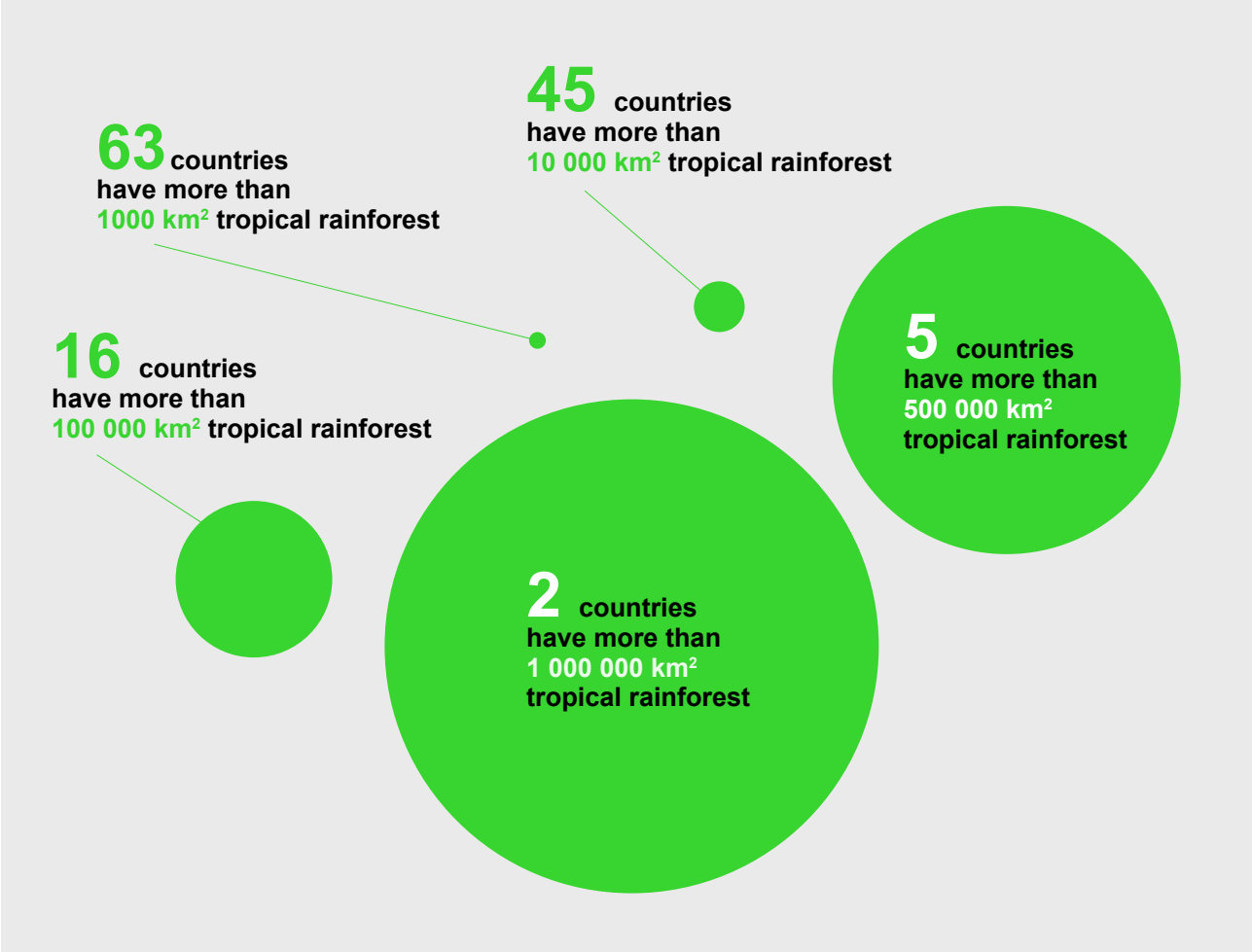
In terms of temperature, a defining factor for a tropical rainforest is that the climate is frost-free. Some areas of montane rainforest may experience rare and brief occurences of night frost, but not more than what plants and trees that are not adapted to frost can withstand[19]. This wet and frost-free climate allows plants to continually grow throughout the year without periods of energy conservation due to frost or drought. This climate creates the most powerful plant growth conditions of any environment on the planet[20].

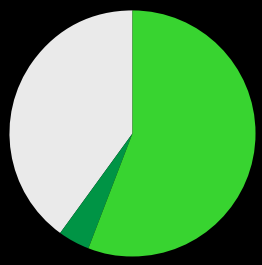
According to the Food and Agriculture Organization of the UN, the frost-free regions of the world are not strictly restricted to the latitude based definition of the tropical zone. There are tropical rainforests as far north as the foothills of the Himalayas, beyond the tropic of Cancer, and as far south as northern Argentina, beyond the tropic of Capricorn[21].

Tropical rainforest in the world: 9 538 022 km²

73 countries still have tropical rainforest

French Guyana, Guadeloupe, and New Caledonia are overseas departments of France. Taiwan is counted as a country.





The tropical rainforest of the world
The Americas 60 %
The Amazon 56 %

America

South America	**5 542 029**
Central America (incl. Mexico)	**194 606**
Caribbean	**11 403**
North America (USA - Hawaii)	**1 986**
Total	**5 750 024**

Africa

Central Africa[22]	**1 740 672**
West Africa[23]	**84 826**
Madagascar	**39 730**
East Africa[24]	**32 374**
Total	**1 897 602**

Asia

Islands (Incl. Sri Lanka, Philippines, Taiwan, excl. West Papua)	**660 971**
Indochina (From Myanmar to Vietnam and China, incl. mainland Malaysia)	**421 481**
Indonesian Papua	**326 310**
India, Bangladesh and Himalaya	**119 315**
Total	**1 528 077**

Oceania

Total 2019	**362 319**

Tropical rainforest per biome

Amazon/Orinoco/Andes	**5 343 645**
Central African rainforest (from eastern Nigeria to Rwanda/ Uganda/Burundi, Cabinda)	**1 722 668**
New Guinea (island)	**607 135**
Borneo	**337 905**
Northern Triangle/Eastern Himalaya (continuous rainforest area from Nepal to northern Myanmar)	**146 232**
Sumatra	**135 591**
Chocó-Darien/Andes west (From Ecuador to Colombia and Panama)	**103 648**
Sulawesi	**90 071**
Yucatan/Maya rainforest (located in Mexico, Belize and Guatemala)	**72 587**
Atlantic rainforest South America (eastern Brazil, eastern Paraguay, and northern Argentina)	**69 179**
Guinea rainforest (West Africa) (From Guinea to western Nigeria)	**67 086**
Madagascar	**39 730**
Selva Miskito (northern Nicaragua and southern Honduras)	**25 546**
New Britain (Island in Papua New Guinea)	**25 449**
Isthmian-Atlantic/Talmancan (Caribbean coast, western Panama to southern Nicaragua)	**21 492**
Konkan/Western Ghat (India's southwest coast)	**15 056**
Maluku (Island in Indonesia)	**13 737**
Australia	**11 715**

Rainforest Foundation Norway's (RFN) priority countries	6 648 116 km^2 of tropical rainforest combined Represent 70 % of the world's tropical rainforest
Brazil, Peru and Colombia	have 46 % of the world's tropical rainforest
Brazil	has 33 % of the world's tropical rainforest
Brazil	has 47 % of all tropical rainforest in RFN's priority countries
Papua (both provinces)	has 39 % of Indonesia's tropical rainforest
Democratic Republic of Congo (DRC)	has 53 % of Africa's tropical rainforest

The world's tropical rainforest in km²

Photo: Rainforest Foundation Norway

South America	
Brazil 2001	3 401 394
• *Amazon*[25]	*3 343 620*
• *Atlantic Rainforest*[26]	*57 774*
Brazil 2019[27]	**3 158 231**
• *Amazon*	*3 102 398*
• *Atlantic Rainforest*	*56 476*
Peru 2001[28]	691 000
Peru 2019	**671 300**
Colombia 2001	548 000
• *Amazon/Andes*[29]	*470 102*
• *Choco/Darien/Andes west*[30]	*77 898*
Colombia 2019[31]	**533 000**
• *Amazon/Andes*	*457 298*
• *Choco/Darien/Andes west*	*75 702*
Venezuela 2001[32]	385 309
• *Amazon/Orinoco*[33]	*357 940*
• *Andes-Amazon*[34]	*9 735*
• *Caribbean Highland*[35]	*5 793*
Venezuela 2019[36]	**380 909**
• *Amazon/Orinoco*	*347 391*
• *Andes-Amazon*	*9 449*
• *Caribbean highland*	*5 559*
Bolivia 2001	312 870
Bolivia 2019[37]	**293 336**
Guyana 2001[38]	173 000
Guyana 2019	**171 750**
Suriname[39]	128 000
Suriname 2019	**126 780**
Ecuador 2001[40]	106 000
• *Amazon/Andes east*[41]	*96 864*
• *Choco/Darien/Andes west*[42]	*9 647*
Ecuador 2019	**104 787**
• *Amazon/Andes east*	*95 379*
• *Choco/Darien/Andes west*	*9 408*
French Guyana 2001[43]	78 500
French Guyana 2019	**78 013**
Paraguay 2001[44]	15 803
Paraguay 2019	**10 703**
Argentina 2007[45]	**13 220**
Total 2019	**5 542 029**
Original	6 631 240

North and Central America	
Mexico 2001[46]	92 100
• *Yucatan (Maya)*[47]	*47 273*
Mexico 2019	**86 160**
• *Yucatan (Maya)*	*43 123*
Panama 2001[48]	29 000
• *Choco/Darien*[49]	*20 614*
• *Isthmian-Atlantic/Talmancan*[50]	*9 498*
Panama 2019	**28 282**
• *Choco/Darien*	*18 538*
• *Isthmian-Atlantic/Talmancan*	*9 241*
Guatemala 2001[51]	25 800
• *Yucatan/Maya*[52]	*23 614*
Guatemala 2019	**21 000**
• *Yucatan/Maya*	*18 974*
Honduras 2001[53]	21 500
• *Selva Miskito*[54]	*18 712*
Honduras 2019	**17 930**
• *Selva Miskito*	*15 581*
Nicaragua 2001[55]	20 200
• *Selva Miskito*[56]	*12 670*
• *Isthmian-Atlantic/Talamancan*[57]	*3 420*
Nicaragua 2019	**15 600**
• *Selva Miskito*	*9 965*
• *Isthmian-Atlantic/Talamancan*	*2 094*
Costa Rica 2001[58]	14 900
• *Isthmian-Atlantic/Talamancan*[59]	*10 260*
Costa Rica 2019	**14 651**
• *Isthmian-Atlantic/Talamancan*	*10 157*
Belize 2001[60]	11 600*
Belize 2019	**10 490**
USA (Hawaii) 2001[61]	2 000
USA (Hawaii) 2019	**1 986**
El Salvador 2001[62]	506
El Salvador 2019	**493**
Total 2019	**196 592**
Original (incl. Caribbean)	440 880

* All is part of the Yucatan/Maya

Caribbean

Cuba 2001[63]	4 010
Cuba 2019	**3 605**
The Dominican Rep 2001[64]	3 170
The Dominican Rep 2019	**2 953**
Jamaica 2001[65]	2 370
Jamaica 2019	**2 274**
Trinidad & Tobago 2001[66]	1 540
Trinidad & Tobago 2019	**1 517**
Puerto Rico 2001[67]	645
Puerto Rico 2019	**483**
Guadalupe (France) 2001[68]	369
Guadalupe (France) 2019	**368**
Dominica 2001[69]	360
Dominica 2019	**203**
Total 2019	**11 403**

Africa

DRC 2001	1 050 000
DRC 2019[70]	**1 001 700**
Gabon 2001[71]	227 000
Gabon 2019	**224 610**
Republic of Congo 2001[72]	212 000
Republic of Congo 2019	**208 760**
Cameroon 2001[73]	191 000
Cameroon 2019	**184 920**
CAR 2001[74]	73 600*
CAR 2019	**72 050**
Liberia 2001[75]	44 300
Liberia 2019	**42 020**
Madagascar 2001[76]	48 200
Madagascar 2019	**39 730**
Equat. Guinea 2001[77]	22 500
Equat. Guinea 2019	**21 912**
Angola 2001[78]	21 810
• *Cabinda*	*3 690*
Angola 2019	**20 675**
• *Cabinda*	*3 490*
Ethiopia 2001[79]	18 900
Ethiopia 2019	**18 189**
Nigeria 2001[80]	19 000**
Nigeria 2019	**17 740**
Ivory Coast 2001[81]	13 700**
Ivory Coast 2019	**10 350**
Ghana 2001[82]	10 900**
Ghana 2019	**10 032**

Tanzania 2001[83]	7 320
Tanzania 2019	**7 051**
Kenya 2001[84]	6 500
Kenya 2019	**6 042**
Uganda 2001[85]	5 090
Uganda 2019	**4 447**
Sierra Leone 2001[86]	2 760
Sierra Leone 2019	**2 495**
Guinea 2001[87]	2 330
Guinea 2019	**2 189**
Mozambique 2001[88]	1 200
Mozambique 2019	**1 092**
South Sudan 2001[89]	837
South Sudan 2019	**819**
Rwanda 2001[90]	537
Rwanda 2019	**534**
Burundi 2001[91]	248
Burundi 2019	**245**
Togo[92]	Below 100***
Benin[93]	Below 100***
Sao Tomé & Principe	Below 100***
Malawi[94]	Below 100***
Zambia[95]	0
Totalt 2019:	**1 897 602**
Original	4 017 705

* Most is degraded ** Most is heavily degraded *** Not part of the total

Asia

Indonesia 2001	938 000
• *Papua*	*332 100*
• *Borneo*	*289 420*
• *Sumatra*	*149 630*
• *Sulawesi*	*97 790*
• *Maluku (The largest island)*	*14 410*
Indonesia 2019[96]	**843 200**
• *Papua[97]*	*326 310*
• *Borneo[98]*	*250 825*
• *Sumatra[99]*	*135 591*
• *Sulawesi[100]*	*90 071*
• *Maluku (The largest island)*	*13 737*
Myanmar 2001[101]	140 000
• *Northern Triangle[102]*	*80 400*
Myanmar 2019	**134 230**
• *Northern Triangle*	*78 195*
Malaysia 2001[103]	**159 000**
• *Borneo[104]*	*106 100*
• *Peninsula[105]*	*52 900*
Malaysia 2019	**132 700**
• *Borneo*	*87 080*
• *Peninsula*	*45 620*
India 2001[106]	98 192
• *Arunachal Pradesh[107]*	*45 900**
• *Konkan/Western Ghat*	*15 144*
India 2019	**95 168**
• *Arunachal Pradesh*	*44 790*
• *Konkan/Western Ghat*	*5 056*
Laos 2001[108]	83 200
Laos 2019	**75 470**
Vietnam 2001[109]	67 300
Vietnam 2019	**60 730**
Thailand 2001[110]	59 400
Thailand 2019	**58 180**
Philippines 2001[111]	45 900
Philippines 2019	**44 470**
Cambodia 2001[112]	42 800
Cambodia 2019	**30 600**
China 2001[113]	17 400
• *Himalaya/Northern Triangle*	*2 739*
China 2019	**16 651**
• *Himalaya/Northern Triangle*	*2 716*
Bhutan 2001[114]	16 100*
Bhutan 2019	**16 033**
Nepal 2001[115]	7 250*
Nepal 2019	**7 214**
Sri Lanka 2001[116]	5 960
Sri Lanka 2019	**5 861**
Brunei 2001[117]	4 310
Brunei 2019	**4 173**
Taiwan 2001[118]	2 527
Taiwan 2019	**2 497**
Bangladesh 2001[119]	966
Bangladesh 2019	**900**
Total 2019	**1 528 077**
Original	3 009 375

Oceania

Papua New Guinea 2001[120]	326 000
• *Islands[121]*	*39 770*
• *New Britain*	*26 900*
• *Main island[122]*	*286 230*
PNG 2019	**318 680**
• *Islands*	*37 855*
• *New Britain*	*25 449*
• *Main island*	*280 825*
Solomon Islands 2001[123]	19 900
Solomon Islands 2019	**18 790**
Australia 2000[124]	12 745
Australia 2019	**11 715**
Fiji 2001[125]	5 330
Fiji 2019	**5 270**
New Caledonia (France) 2008[126]	**4 034**
Vanuatu 2001[127]	3 680
Vanuatu 2019	**3 642**
Palau 2001[128]	190
Palau 2019	**188**
Samoa 2004[129]	0,8**
Total 2019	**362 319**
Original	481 313

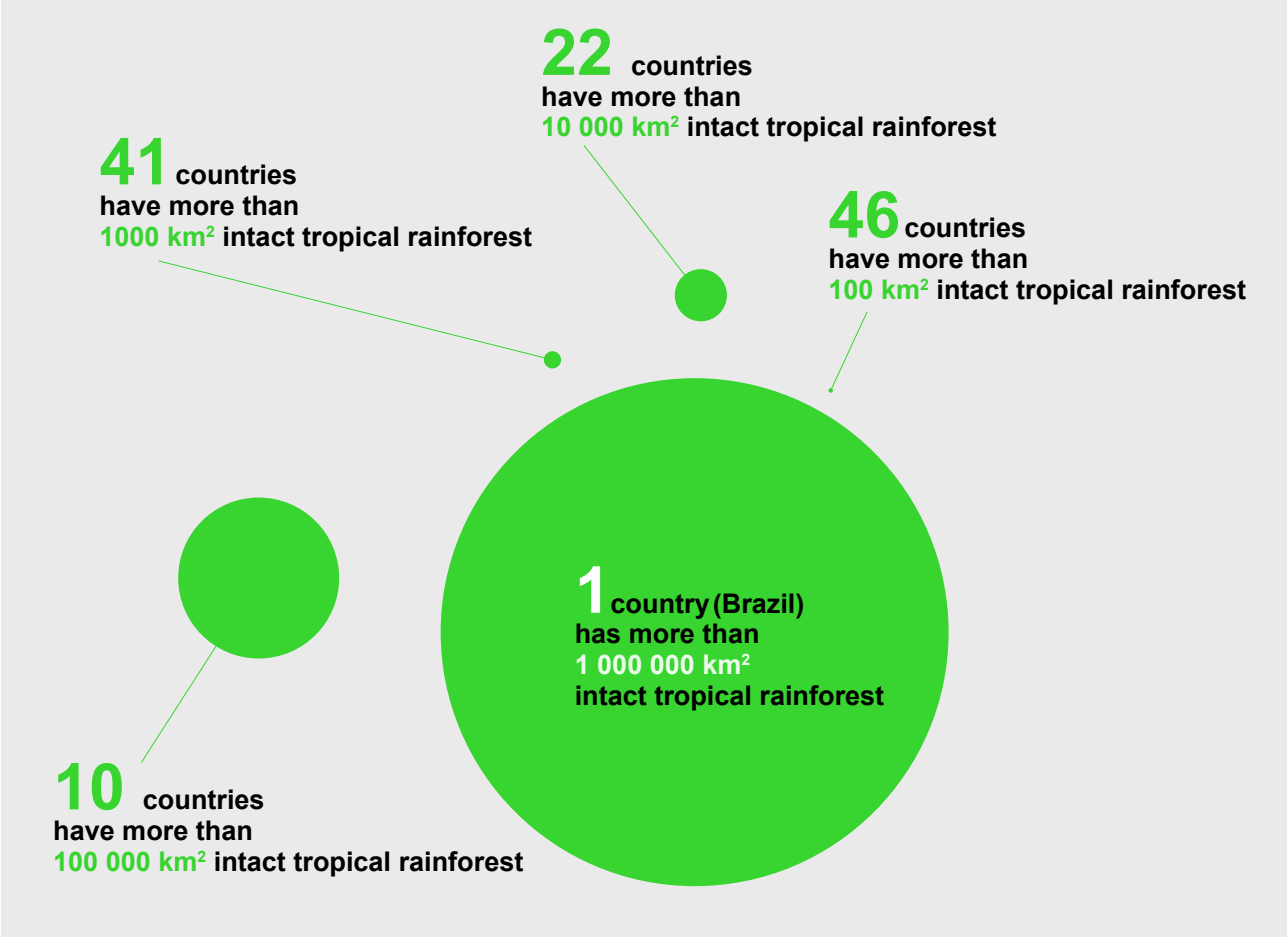
Summary

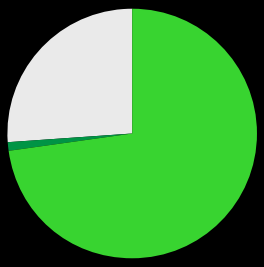
South America	5 542 029
Africa	1 897 602
Asia	1 528 077
Oceania	362 319
North and Central America	196 592
Caribbean	11 403
Total	**9 538 022**
Original	14 580 513

* Part of the Eastern Himalaya rainforest ** Not part of the total

Intact* tropical rainforest in the world in 2016: 5 247 415 km²

55% of the world's rainforest is intact





The intact tropical rainforest of the world
The Americas 74 %
The Amazon 73 %

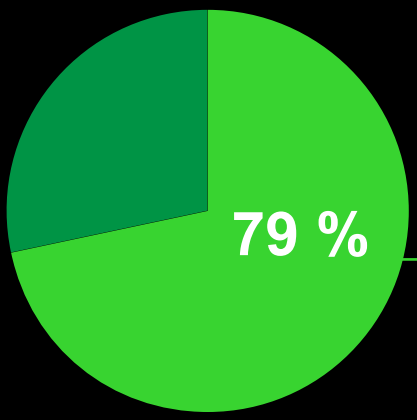
* Refers to how much of the world's tropical rainforest that is still left in an intact condition.

Intact tropical rainforest per geographical region	
South America	**3 859 140**
Africa	**835 962**
• *Central Africa (DRC, Congo rep., Gabon, Equ. Guinea, Cameroon, Angola, Uganda, CAR)*	*818 023*
• *West Africa (Nigeria, Ivory Coast, Liberia)*	*3 479*
• *East Africa (Tanzania, Ethiopia)*	*2 960*
• *Madagascar*	*11 500*
Oceania (includes the entire New Guinea island)	**268 664**
• *Melanesia (Indonesian Papua and Papua Barat, PNG, Solomon Islands, Vanuatu)*	*264 512*
• *Australia*	*4 152*
Asia (excl. Indonesian Papua)	**251 366**
• *Continental (India, Bhutan, Myanmar, Thailand, Malaysian mainland, Laos, Vietnam)*	*82 276*
Central America (incl. Mexico)	**46 630**
Caribbean (only the Dominican Republic)	**558**
Total	**5 247 415**

Intact tropical rainforest per biome (2016)	
Amazon/Orinoco/Andes east	3 832 480
Central African rainforest (eastern Nigeria to Uganda)	817 719
New Guinea (island)	248 920
Borneo (three countries)	93 520
Sumatra	36 281
Northern Triangle/eastern Himalaya	31 744
Sulawesi	28 270
Choco-Darien (Colombia, Panama, Ecuador)	24 054
Yucatan/Maya (Mexico, Guatemala, Belize)	17 420
Northern Triangle (Northern Myanmar, bordering China and India)	16 214
Eastern Himalaya (Arunachal Pradesh, Bhutan)	15 530
Madagascar	11 500
New Britain (Island in Papua New Guinea)	8 260
Selva Miskito (Nicaragua north, Honduras east)	7 880
Isthmian-Atlantic/Talmancan (Caribbean coast, western Panama to southern Nicaragua)	5 521
Australia	4 152
Maluku (the largest island in Indonesia)	3 930
Atlantic rainforest South America (Eastern Brazil, Paraguay, north-eastern Argentina)	2 900
Guinea rainforest (West Africa) (From Guinea to eastern Nigeria)	2 894

Share of intact tropical rainforest in the world	
Brazil	42,0 %
DRC	11,5 %
Peru	10,0 %
Colombia	6,5 %
Indonesia	5,5 %
PNG	2,4 %
Myanmar	0,5 %
America (North America, South America, Central America, Caribbean)	74,0 %
Africa (Includes Madagascar)	16,0 %
Asia (Includes Indonesian Papua)	6,5 %
Oceania (Excludes Indonesian Papua)	2,5 %
Amazon/Orinoco/Andes east	72,0 %
Central Africa	15,5 %
New Guinea (island)	4,8 %
Borneo	1,8 %
Continental Asia	1,6 %
Sumatra	0,7 %

Share of the countries' tropical rainforest in intact condition	
Peru	77,5 %*
Brazil	70,5 %
Colombia	63,0 %
DRC	60,0 %
The world	55,0 %
PNG	39,0 %
Indonesia	35,0 %
Myanmar	17,5 %
Amazon/Orinoco/Andes east	68,0 %
Central Africa	47,0 %
New Guinea (island)	41,0 %
New Britain (Island in PNG)	32,5 %
Selva Miskito	32,5 %
Sulawesi	31,5 %
Northern Triangle/Eastern Himalaya	30,0 %
Madagascar	28,5 %
Maluku (the largest island)	28,5 %
Sumatra	27,0 %
Yucatan/Maya	24,5 %
Isthmian-Atlantic/Talmancan	24,0 %
Borneo	22,5 %
Choco-Darien	21,5 %
Australia	21,0 %
Atlantic rainforest South America	6,0 %
Guinea rainforest (West Africa)	4,0 %



Intact tropical rainforest in RFN priority countries have

4 133 900 km²

of the world's intact tropical rainforest

* Largest share in the world

Photo: Thomas Marent

Intact tropical rainforest in the world in 2016 in km^2 [130]

Photo: Rainforest Foundation Norway

South America	
Brazil 2016	**2 230 000**
• *Amazon/Orinoco/Andes east*	*2 227 100*
• *Atlantic rainforest*	*2 900*
Peru 2016	**518 000**
Colombia	**339 000**
• *Choco/Darien*	*15 820*
• *Andes East*	*3 615*
• *Amazon lowland*	*319 565*
Venezuela	**298 000**
Bolivia	**138 100**
Guyana	**121 000**
Suriname	**97 700**
French Guyana (France)	**60 600**
Ecuador	**48 800**
Argentina	**7 940**
Total 2016	**3 859 140**

Central America (incl. Mexico)	
Mexico	**13 200**
Panama	**11 300**
• *Choco/Darien*	*9 727*
Nicaragua	**6 060**
Guatemala	**4 730**
Honduras	**4 600**
Belize	**3 710**
Costa Rica	**3 030**
Total	**46 630**

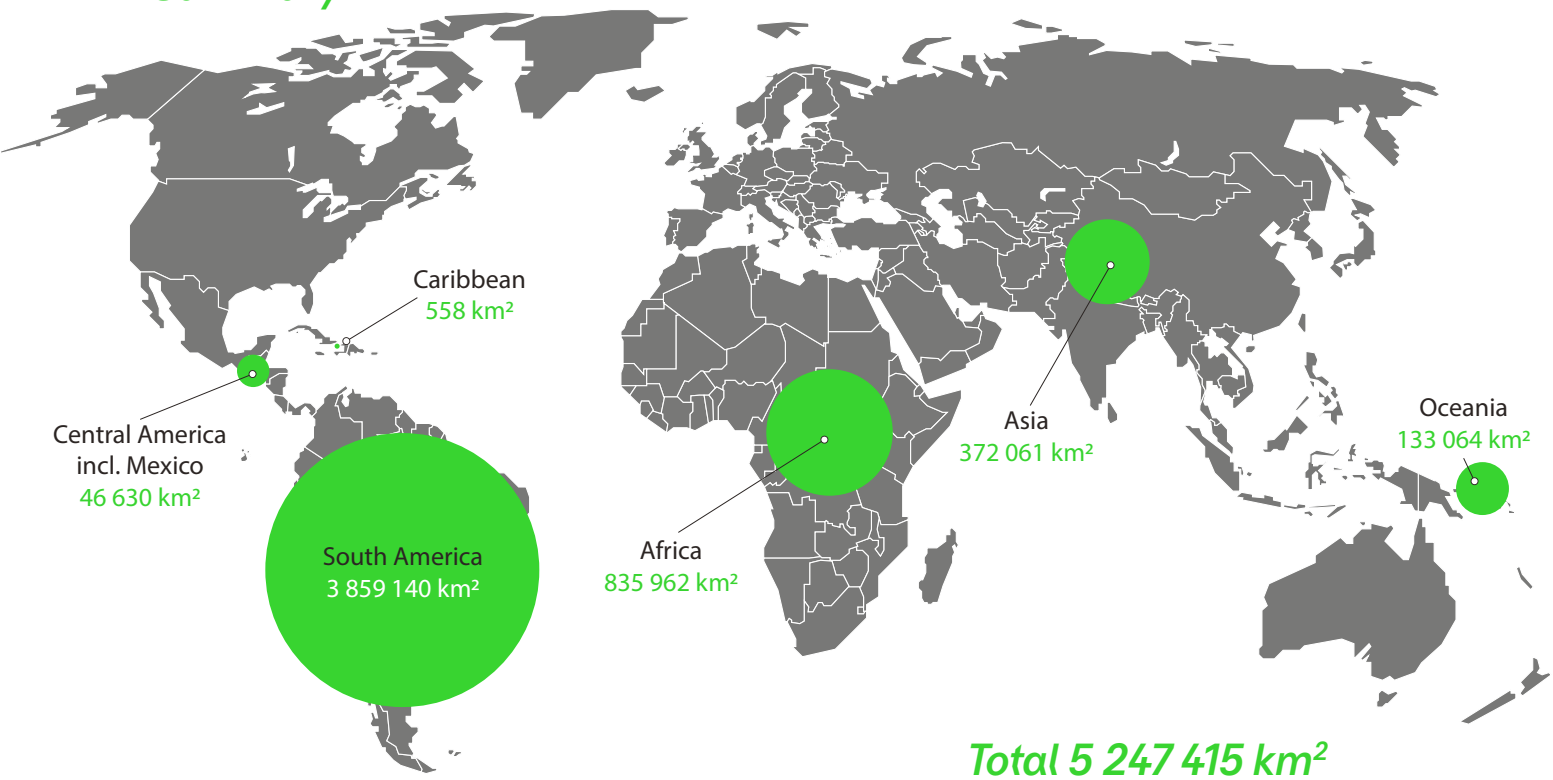
Caribbean	
The Dominican Republic	**558**
Total	**558**

Africa	
DRC	**604 000**
Republic of Congo	**103 000**
Gabon	**72 800**
Cameroon	**30 200**
Madagascar	**11 500**
CAR	**4 760**
Equatorial Guinea	**1 860**
Liberia	**1 970**
Ethiopia	**1 650**
Tanzania	**1 310**
Ivory Coast	**924**
Angola	**889**
Nigeria	**585**
Uganda	**514**
Total	**835 962**

Asia	
Indonesia	**294 000**
• *Papua (both provinces)*	*135 600*
Myanmar	**23 900**
India[131]	**15 441**
Malaysia	**15 200**
• *Mainland*	*8 290*
Thailand	**10 580**
Philippines	**3 430**
Laos	**3 410**
Vietnam	**2 580**
Bhutan	**1 910**
Brunei	**1 610**
Total	**372 061**

Oceania	
Papua New Guinea	**125 000**
• *Islands*	*11 680*
Australia	**4 152**
Solomon Islands	**3 270**
Vanuatu	**642**
Total	**133 064**

Summary



Total 5 247 415 km²

Deforestation in km²

Photo: Live Danielsen

South America	
Brazil 2002-2019	243 163
• *Amazon*	*241 180*
• *Atlantic rainforest*	*1 983*
Brazil 2019	13 511
• *Amazon*	*13 420*
• *Atlantic rainforest*	*91*
Peru 2002-2019	19 700
Peru 2019	1 620
Bolivia 2002-2019[132]	19 178
Bolivia 2019[133]	1 212
Colombia 2002 - 2019	15 000
• *Amazon/Andes east and central*	*13 083*
• *Choco/Darien*	*1 917*
Colombia 2019	1 150
Venezuela 2002-2019	4 800
• *Amazonas*	*3 606*
• *Andes/Amazon*	*885*
Venezuela 2019	588
Paraguay 2002-2019	4 613
Paraguay 2019	299
Ecuador 2002-2019	1 730
• *Amazon/Andes east*	*1 486*
• *Choco/Darien*	*242*
Ecuador 2019	122
Guyana 2002-2019	1 250
Guyana 2019	130
Suriname 2002-2019	1 220
Suriname 2019	140
French Guyana 2002-2019	487
French Guyana 2019	23
Argentina	N/A
Total 2002-2019	**311 141**
Total 2019	**18 795**

North and Central America	
Mexico 2002-2019	5 940
• *Yucatan/Maya*	*4 150*
Mexico 2019	658
Guatemala 2002-2019	4 800
• *Yucatan/Maya*	*4 640*
Guatemala 2019	303
Nicaragua 2002-2019	4 600
• *Selva Miskito*	*2 705*
Nicaragua 2019	339
Honduras 2002-2019	3 570
• *Selva Miskito*	*3 131*
Honduras 2019	329
Belize 2002-2019	1 110
Belize 2019	87
Panama 2002-2019	718
• *Choco/Darien*	*2 076*
• *Isthmian-Atlantic/Talmancan*	*253*
Panama 2019	62
Costa Rica 2002-2019	249
• *Isthmian-Atlantic/Talmancan*	*103*
Costa Rica 2019	14
USA (Hawaii) 2002-2019	14
USA (Hawaii)	1
El Salvador 2002-2019	13
El Salvador 2019	1
Total 2002-2019	**21 014**
Total 2019	**1 794**

Caribbean	
Cuba 2002-2019	409
Cuba 2019	1
Dominican Rep. 2002-2019	217
Dominican Rep. 2019	5
Puerto Rico 2002-2019	162
Jamaica 2002-2019	96
Jamaica 2019	3
Trinidad & Tobago 2002-2019	23
Trinidad & Tobago 2019	1
Dominica 2002-2019	157
Guadalupe 2002-2019	1
Total 2002-2019	**1 065**
Total 2019	**10**

Africa	
DRC 2002-2019	48 300
DRC 2019	4 750
Madagascar 2002-2019	8 470
Madagascar 2019	542
Cameroon 2002-2019	6 080
Cameroon 2019	544
Ivory Coast 2002-2019	3 350
Ivory Coast 2019	116
Republic of Congo 2002-2019	3 240
Republic of Congo 2019	306
Liberia 2002-2019	2 280
Liberia 2019	234
Gabon 2002-2019	2 390
Gabon 2019	138
CAR 2002-2019	1 550
CAR 2019	115
Nigeria 2002-2019	1 260
Nigeria 2019	121
Angola 2002-2019	1 135
• *Cabinda*	*200*
Angola 2019	94
Ghana 2002-2019	868
Ghana 2019	58
Ethiopia 2002-2019	711
Ethiopia 2019	74
Uganda 2002-2019	643
Uganda 2019	33
Equatorial Guinea 2002-2019	588
Equatorial Guinea 2019	43
Kenya 2002-2019	458
Kenya 2019	28
Tanzania 2002-2019	269
Tanzania 2019	27
Sierra Leone 2002-2019	265
Sierra Leone 2019	35
Guinea 2002-2019	133
Guinea 2019	11
Mozambique 2002-2019	108
Mozambique 2019	8
South Sudan 2002-2019	18
South Sudan 2019	3
Rwanda 2002-2019	3
Burundi 2002-2019	3
Total 2002-2019	**82 122**
Total 2019	**7 280**

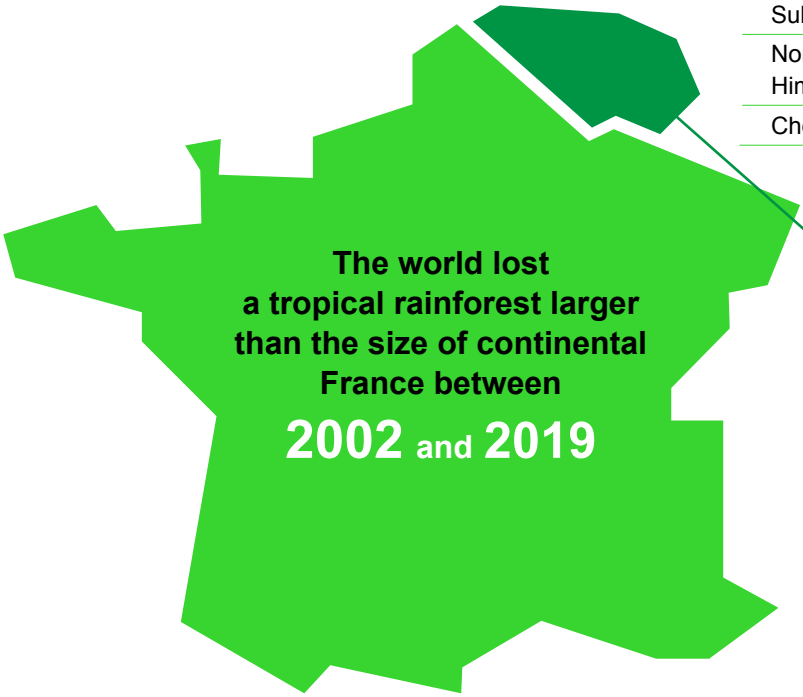
Asia	
Indonesia 2002-2019	**94 800**
• *Sumatra*	*38 443*
• *Borneo*	*39 627*
• *Papua*	*6 060*
• *Sulawesi*	*7 999*
• *Maluku (largest island)*	*673*
Indonesia 2019	**3 240**
Malaysia 2002-2019	26 300
• *Borneo*	*19 020*
Malaysia 2019	1 200
Cambodia 2002-2019	12 200
Cambodia 2019	629
Laos 2002-2019	7 730
Laos 2019	720
Vietnam 2002-2019	6 570
Vietnam 2019	309
Myanmar 2002-2019	5 770
• *Northern triangle*	*2 205*
Myanmar 2019	383
India 2002-2019	3 024
• *Arunachal Pradesh*	*1 110*
• *Konkan/Western Ghat*	*88*
India 2019	151
Philippines 2002-2019	1 430
Philippines 2019	76
Thailand 2002-2019	1 220
Thailand 2019	26
China 2002-2019	749
• *Eastern Himalaya/Northern Triangle*	*23*
China 2019	14
Brunei 2002-2019	137
Brunei 2019	4
Sri Lanka 2002-2019	99
Sri Lanka 2019	4
Bhutan 2002-2019	67
Bhutan 2019	3
Bangladesh 2002-2019	66
Bangladesh 2019	4
Nepal 2002-2019	36
Nepal 2019	2
Taiwan 2009-2019	30
Taiwan 2019	1
Total 2002-2019	**160 228**
Total 2019	**6 766**

Oceania	
PNG 2002-2019	7 320
• *Islands*	*1 916*
• *New Britain*	*1 451*
• *Mainland*	*5 404*
PNG 2019	580
Solomon Islands 2002-2019	1 110
Solomon Islands 2019	123
Fiji 2002-2019	60
Fiji 2019	1
Vanuatu 2002-2019	38
Vanuatu 2019	1
Palau 2002-2019	2
Australia 2002-2019	1 018
Australia 2019	173
New Caledonia	N/A
Total 2002-2019	**9 548**
Total 2019	**878**

Total deforestation in the world	
2002-2019	**585 118**
2019	**35 523**

Deforestation per biome 2002-2019	
Amazon/Orinoco/Andes east	302 075
Central Africa	62 997
Borneo	58 784
Sumatra	38 443
New Guinea (island)	11 464
Yucatan (Maya)	9 830
Sulawesi	7 999
Selva Miskito	5 836
Choco/Darien	4 235
Northern Triangle/Eastern Himalaya	2 710
Atlantic rainforest South America	1 880

Tropical rainforest loss per biome 2019	
Amazon/Orinoco/Andes East	18 266
Central Africa	6 150
Borneo	2 173
Yucatan/Maya	818
Sumatra	733
New Guinea (Island)	720
Selva Miskito	518
Atlantic Rainforest SA	437
Sulawesi	417
Northern Triangle/Eastern Himalaya	304
Choco/Darien	171



The world lost on average a tropical rainforest area the size of Belgium every year in the same period.

Methodology

Photo: Thomas Marent

How to define a tropical rainforest? The World Wide Fund for Nature (WWF) has defined a broad ecological region called "Tropical and Subtropical Moist Broadleaved Forests"[134]. This is more inclusive than what strictly constitutes a tropical rainforest according to UN Food and Agriculture Organization (FAO) tropical rainforest definition and zoning[135]. It includes drier deciduous forest types that do not have the same ecological qualities as a tropical rainforest, like the "Bahia Interior Forest"[136].

The lower lying areas of the ecozone defined by FAO as "Tropical mountain systems" include premontane evergreen rainforests and cloud forests which grow at elevations above 1000 - 1500 meters above sea level (masl), depending on local variations. Tropical cloud forests can grow up to about 2500 masl, and they have much of the same ecological qualities as lowland rainforests[137]. Although cloud forests normally receive less rainfall than lower lying rainforests, they can capture moisture directly from an almost constant mist that forms due to a cooler temperature, and this way maintain as wet and evergreen, and support a rich ever-growing plant environment. Cloud forests normally have lower tree stature but can be more species-rich per area than the lowland rainforests.

Global Forest Watch (GFW)[138] operates with a forest definition called "primary forest", defined as tropical humid forest that has not been completely removed and regrown in recent history (30-50 years). This forest category has been defined by scientists from the University of Maryland (Turubanova et. al.)[139], and the data is available for the public at the GFW net based forest monitoring platform[140]. The

extent of this forest category was established for the year 2001, and it is now possible to monitor the state and change of this forest for every year from 2002 to 2019.

GFW's "primary humid tropical forest" fits quite well with FAO's "tropical rainforest" ecozone and the parts of FAO's "tropical mountain systems" ecozone that correspond to sub-montane evergreen rainforests and cloud forests[141]. It does, however, deviate from FAO in two significant areas: The Yucatan forest in Mexico, and the Chiquitano forest in Bolivia and Brazil. It also deviates from FAO in smaller parts of the South American savanna (Cerrado), southern Africa, Laos and Vietnam, and northern India. To determine if these forest areas fit the "tropical rainforest" definition of this report, we have compared them to the WWFs world's ecological regions overview[142].

The Chiquitano forest in South America is clearly described by WWF as a tropical dry forest. Due to a prolonged and distinct dry season, this forest has a 500 mm yearly precipitation deficit to sustain a rainforest environment[143]. The Chiquitano transitions from semi-deciduous to deciduous forest. This forest is located outside of FAO's tropical rainforest ecozone, in what FAO calls the "tropical moist forest" ecozone. While this forest falls within GFW's definition of "humid tropical forest", it does not fit well with what constitutes a tropical rainforest defined in this report, as it does go through a solid drought stress period which affects plant growth during the dry season.

On the other hand, the WWF's "Yucatan Moist Forests"[144] ecological region is not defined as a tropical rainforest by FAO. It lies within FAO's definition of a "tropical moist forest"[145], with a delimitation criteria of annual precipitation between 1000 mm and 2000 mm, and a dry season of 3-5 months. However, this is such a broad category that it includes everything from semi-evergreen broadleaved dense moist forests, which fits well with what is termed tropical rainforest in this report, to more open and drier short statured woodlands like the Miombo in southern Africa[146] and the Cerrado[147] and Chaco[148] in South America.

◂◂To determine the extent and historical loss of tropical rainforest, we have used the Global Forest Watch platform and the land cover category termed "primary forest" ▸▸

Global Forest Watch's "primary forest"

To determine the extent and historical loss of tropical rainforest, we have used the Global Forest Watch platform and the land cover category termed "primary forest", which is the same as the above-mentioned definition of humid tropical forest that has not been completely removed and regrown in recent history (30-50 years). We have left out the areas of this land cover category that do not fit with a tropical rainforest definition, by comparing it to FAO's eco-zoning and WWF's descriptions of the world's ecological regions. These are the Chiquitano dry forest and parts of the dry and humid Chaco forest and Cerrado savanna in Bolivia, Brazil and Paraguay; the Kabompo Dry Evergreen Forest[149] in north-western Zambia and eastern Angola; and the moist deciduous forests of eastern and southern India[150]. We have also left out most of the patches of tropical gallery (or riparian) forests that grow in wet soils by rivers and lakes on tropical savannas. These do not have the same ecological qualities as tropical rainforests[151], although historically they may have served as important sanctuaries for rainforest species when local climatic conditions have been unfavourable for rainforest environments.

We have used a canopy threshold of minimum 30 % as baseline for what constitutes a forest. This is a very low canopy threshold for a tropical rainforest and includes heavily degraded forest areas. It does not, however, include previously (30-50 years) deforested areas. This distinction is important, because degraded forests, if left alone, can restore key ecological functions much faster than completely removed forests (deforestation), depending on the degree of degradation[152]. We have compared the 30 % + canopy threshold with a 75 % + canopy threshold and found a difference of no more than 345 390 km^2 globally.

WWF's ecological regions of the world is a layer that can be applied to the GFW map. However, it is only possible to analyse this layer on tree cover extent with a 30 % + canopy threshold. It does not allow for analysing the extent of "primary humid tropical forest", so unfortunately the ecoregion layer cannot be applied for the purpose of this report. We have instead compared the WWF's ecoregion layer with the political boundaries of regions and municipalities, and included the primary humid tropical forest cover of the municipalities that best corresponds with the limits of the ecological regions of interest for the purpose of this report (e.g. to divide highland rainforests from lowland rainforests, and divide the dry forests of Bolivia and Paraguay from the rainforests etc.).

For some reason, the GFW platform does not include "primary humid tropical forest" data for Australia. To determine the tropical rainforest extent of Australia we have therefore compared the tree cover 30 % + layer with the Queensland tropical

rainforest layer of WWF's ecological regions, and subtracted the area of tree plantations.

For Argentina, the method applied in this report could not be used to determine the tropical rainforest cover of the country within a reasonable margin of error, so the data used here are official data from 2007. Deforestation data for tropical rainforests in Argentina is not available. However, it was possible to estimate the extent of intact tropical rainforest in Argentina using the method described in this report.

We have compared the GFW data with other research on tropical rainforest extent and degradation for each rainforest country for comparison, all of which are referenced in the footnotes. With some exemptions, there is a very high consistency between available official rainforest data and other research on rainforest cover, and the data extracted in this report for GFW's "primary forest" cover. For some countries, there are minor data discrepancies due to different forest monitoring methods. For the countries with the largest discrepancies, the differences are most likely due to the exclusion of younger secondary forest in the GFW data. At a global scale, though, the discrepancies are minor, suggesting a close match between GFW's "primary forest" category and what constitutes a natural forest within the tropical rainforest ecozone as defined in this report.

Intact tropical rainforest
We have used the Intact Forest Landscape (IFL)[153] definition to estimate how much of the world's tropical rainforest that is still left in a pristine condition. An intact forest by this definition, differs from non-degraded primary forests by having a threshold of minimum 500 km^2 forest patch size. This makes sense because even if the forest canopy has not been reduced, small forest patches lose their ability to uphold key ecological functions, like conserving biodiversity and store carbon. By using this definition of an intact forest, all standing tropical rainforest that do not match this is considered degraded to a certain extent. We have estimated the extent of intact tropical rainforest by including the IFL areas that overlap the above mentioned "primary humid tropical forest" layer, excluding the areas of this category that do not fit with a tropical rainforest biome as described above.

There are different ways of defining what constitutes an intact forest, and debates are vibrant within the forest research community about the most pertinent definition. Nonetheless, intact forests are important to map and monitor so that conservation policies can urgently target the most valuable forest estates left in the world with the right measures. To halt degradation and fragmentation of intact forest areas may require different and additional policy measures than a more general policy to reduce or halt deforestation and degradation, as we have seen in many REDD+ and other initiatives the last decade. At the same time, it must be stressed that all natural forests, no matter what state of degradation they are in, do possess valuable ecosystem services worthy of conservation measures. Many degraded forests can also recover to an intact state relatively quickly if protected, which for a deforested area can take centuries. Defining and monitoring intact forests does not underplay the ecological value of degraded forests, and measures to protect the intact forests should not undermine current or future efforts to halt deforestation in natural forest in general. But to measure and expose the real conditions of the world's last natural forests, is a crucial tool both to guide policies and to skew more conservations efforts towards forests in general.

◂◂ Intact forests are important to map and monitor so that conservation policies can urgently target the most valuable forest estates left in the world. ▸▸

Original tropical rainforest cover
We have used FAO's tropical rainforest ecozone[154] to determine the approximate original extent of tropical rainforest, and this way be able to compare the original with the present state of this magnificent forest biome[155]. This is approximate, as no one knows exactly how much tropical rainforest there were before humans started to severely destroy this ecosystem a few hundred years ago. FAO's ecozone research constitutes an attempt to estimate both the existing and the potential extent of the world's main ecosystems by defining their present ecological zone based on primarily climatic conditions. This way, and with some caution, it is an estimation of the natural extent of the world's main ecosystems, as they were before humans began destroying them significantly. Over the course of thousands and millions of years, the tropical rainforest has to a certain extent increased and shrunk, back and forth, by natural causes like climate change. Most of the tropical rainforest destruction caused by humans, however, has happened only over the course of the past century.

Endnotes

1) http://www.fao.org/3/ad652e/ad652e07.htm#TopOfPage
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2) https://www.sciencedaily.com/releases/2011/10/111028082115.htm
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https://www.researchgate.net/publication/328837384_Grass_Species_Flammability_Not_Biomass_Drives_Changes_in_Fire_Behavior_at_Tropical_Forest-Savanna_Transitions
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9) https://www.worldwildlife.org/ecoregions/at0718
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20) https://www.worldwildlife.org/biomes/tropical-and-subtropical-moist-broadleaf-forests
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http://www.fao.org/3/ad652e/ad652e18.htm#TopOfPage
http://www.fao.org/3/ad652e/ad652e20.htm#TopOfPage
22) DRC, Gabon, Republic of Congo, Cameroon, CAR, Equatorial Guinea, Angola, Uganda, Rwanda, Burundi, South Sudan.
23) Nigeria, Ivory Coast, Ghana, Liberia, Guinea, Sierra Leone
24) Ethiopia, Kenya, Tanzania, Mozambique
25) GFW primary forest 30 % + canopy cover in the Legal Amazon (Acre, Amazonas, Roraima, Para, Amapa, Maranon, Tocantins, Mato Grosso, Rondonia).
20 % of what has historically been deforested has started to regrow:
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https://redd.unfccc.int/files/redd_brazil_frel_final_19nov.pdf
PRODES historical deforestation:
http://terrabrasilis.dpi.inpe.br/en/home-page/
26) GFW primary forest 30 % + canopy cover in the regions of Santa Catarina, Parana, Sao Paolo, Rio de Janero, Espirito Santo, Bahia, Sergipe and Alagoas.
27) GFW primary forest loss 2002-2019 subtracted
28) GFW primary forest 30 % + canopy cover
According to official estimates Peru had 684 226 km^2 of rainforest in 2018:
http://geobosques.minam.gob.pe/geobosque/view/perdida.php
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29) GFW primary forest 30 % + canopy cover in relevant regions
30) GFW primary forest 30 % + canopy cover in relevant regions.
31) GFW primary forest 30 % + canopy cover.
Official figures for the Amazon and Andes (below 2500 masl) and pacific rainforest = 524 772 km^2. There are also some rainforest in the Caribbean and Llanos regions, but these regions also have a lot of other types of tropical forest.
http://smbyc.ideam.gov.co/MonitoreoBC-WEB/pub/reporteGeoproceso.jsp?id_reporte=3681
https://www.researchgate.net/profile/Dolors_Armenteras/publication/236173774_Ecosistemas_de_los_andes_Colombianos/links/547b439c0cf205d16881c3f0/Ecosistemas-de-los-andes-Colombianos.pdf page 50, 51 and 81) – We have used this report to find rainforest data for the Andean region.
https://ecopedia.cvc.gov.co/sites/default/files/archivosAdjuntos/bosquesandinosysubandinosvalledelcauca_0.pdf page 13: The temperate zone in the Colombian Andes has a lower limit at 2700-2900 masl.
https://www.worldwildlife.org/ecoregions/nt0136
https://www.worldwildlife.org/ecoregions/nt0118
https://www.worldwildlife.org/ecoregions/nt0159
http://www.fao.org/3/a-az187s.pdf
32) GFW primary forest 30 % + canopy cover.
GFW primary forest for Venezuela fits well with FAOs map showing of the tropical rainforest ecological zone.
https://www.researchgate.net/publication/216152618_The_State_of_Venezuela's_Forests_A_Case_Study_of_the_Guayana_Region
https://www.jstor.org/stable/30043221?seq=1
http://bft.cirad.fr/cd/BFT_295_21-33.pdf
https://globalforestatlas.yale.edu/amazon-forest/regional-governance/forest-governance-venezuela

https://www.worldwildlife.org/ecoregions/nt1301
https://www.worldwildlife.org/ecoregions/nt0219
https://www.worldwildlife.org/ecoregions/nt1408
https://en.wikipedia.org/wiki/Category:Ecoregions_of_Venezuela
33) GFW primary forest 30 % + canopy cover in the regions of Amazon, Bolivar og Delta Amacuro, and Maturin in Monagas, and Benitez in Sucre.
https://www.worldwildlife.org/ecoregions/nt0147
https://lacgeo.com/orinoco-delta-swamp-forests-ecoregion
https://lacgeo.com/guianan-moist-forests-ecoregion
34) GFW primary forest 30 % + canopy cover in the regions of Tachira, Merida, Trujillo, and Lara, and in the municipalities of Alberto Arvelo, Cruz paredes, Bolivar, Pedraza, Antonio Jose de Sucre and Ezequiel Zamora in the region Barinas.
Venezuela has some highland rainforest in the Andes which is part of the rainforest that stretches from Venezuela into Colombian Andes and Amazon regions.
https://www.worldwildlife.org/ecoregions/nt0108
https://lacgeo.com/venezuelan-andes-montane-forests-ecoregion
35) GFW primary forest 30 % + canopy cover in all municipalities in the region of Sucre except from Benitez, and in the regions of Miranda, Vargas, Caracas, Aragua, Carabobo, Yaracuy, Falcon.
https://www.worldwildlife.org/ecoregions/nt0117
36) GFW 2002-2019 primary forest loss subtracted
37) GFW primary forest 30 % + canopy cover in the following municipalities of Santa Cruz region: Chiquitos, Cordillera, and Jose Miguel de Velasco. Government forest data from the following study suggest a tropical rainforest area in Bolivia of 323 389 km^2 in 2013: https://observatorioccd-bolivia.files.wordpress.com/2015/06/01-memoria-tecnica-mapa-bosque-2013-otca.pdf The following forest areas described in this paper fit a tropical rainforest definition: Bosque Amazonico, Bosque Yungas, Bosque Tucumano, Bosque de Lllano Inundables. In this figure, the Chiquitano and the Chaco dry forests as determined according to official estimates has been excluded. This is thus more accurate than what is presented in this report. Still it is not very far off, so the general picture presented in this report for the state of the tropical rainforest in Bolivia is probably within a reasonable error margin.
http://www.fao.org/3/a-az169s.pdf (page 9-11) the Chiquitano forest, which forms part of GFW's primary humid tropical forest definition, is not tropical rainforest.
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4874403/
https://www.researchgate.net/figure/Views-of-the-Bolivian-Chiquitano-tropical-dry-forest-during-the-dry-season-The-inset_fig7_257649971
https://www.researchgate.net/figure/Ecoregions-of-Ecuador-Peru-and-Bolivia-1-Western-Ecuador-moist-forests-2-Ecuadorian-dry_fig82_303041091
https://www.worldwildlife.org/ecoregions/nt0212
https://www.museonoelkempff.org/sitio/Informacion/Publicaciones/Chiquitano%20Forest%20text.pdf
https://photos.mongabay.com/07/brazil/amazon_basin_map-max.jpg
Much of the forest firest in Bolivia occurs in Chiquitano, and it was hard hit in 2019:
https://theconversation.com/its-not-just-brazils-amazon-rainforest-thats-ablaze-bolivian-fires-are-threatening-people-and-wildlife-122335
https://es.mongabay.com/2019/08/bolivia-incendios-bosques-chiquitania-fotos/
https://www.fcbc.org.bo/bosque-seco-chiquitano/
https://web.archive.org/web/20071018040214/http://www.idrc.ca/es/ev-100668-201-1-DO_TOPIC.html
https://www.cfb.org.bo/bolivia-forestal/bosques-en-bolivia
https://www.researchgate.net/figure/Ecoregions-of-Ecuador-Peru-and-Bolivia-1-Western-Ecuador-moist-forests-2-Ecuadorian-dry_fig82_303041091
Forest zones Bolivia: https://geo.gob.bo/portal/?GeoBolivia-Mapa-del-mes-Abril-2015
38) GFW primary forest extent 30 % + canopy cover.
http://www.fao.org/3/a-az232e.pdf (page 10) Guyana has on page 9 in the defined 3 forest types: Tropical High Forest, Savanna Forest > 30 % canopy cover, og mangrove forests. Tropical high forest is tropical rainforest. The data on page 9 include water surfaces. So we have used the total on page 10, and subtracted the savanna total on page 9. That indicates a total rainforest cover of 163 890 km^2 in 2010 according to official data.
https://www.regjeringen.no/contentassets/6a81714468874be7bf210d-d4d09cfa33/measurementandreportingofforest-guyana.pdf page 4, High Forest 156 465 km^2 in 2009.
39) GFW primary forest extent 30 % + canopy cover.
Official data indicate 153 190 km^2 of rainforest in 2015:
http://www.fao.org/3/a-az343e.pdf (page 18)
http://www.fao.org/docrep/013/al634E/al634E.pdf
40) GFW primary forest extent 30 % + canopy cover.
Official data indicate an evergreen forest cover below 2900 masl at 98 936 km^2 in 2013:
http://www.fao.org/3/a-az203s.pdf (page 22-23) not included «bosque siempreverde Andino de la ceja Andina» as this is above 2900 masl and the plants experience frost. This forest type is also called «bosque andino de montano alto»: http://infobosques.com/descargas/biblioteca/200.pdf (page 17 og 18)
The category «bosque siempre verde andino montano» is included. It grows up until 2900 at is for the most part evergreen clod forest.
https://biblio.flacsoandes.edu.ec/libros/digital/55826.pdf
http://suia.ambiente.gob.ec/documents/10179/185860/MAE_2016_11_21+ART+LIBRO+REDD+17+nov+2016.pdf/e282f00c-37b2-4183-8349-54ecc9837bc8
http://www.quitoambiente.gob.ec/ambiente/images/Secretaria_Ambiente/Documentos/patrimonio_natural/biodiversidad/guia_ecosistemas_dmq.pdf
https://www.researchgate.net/publication/311535643_The_Ecuadorian_National_Forest_Inventory
http://app.sni.gob.ec/sni-link/sni/PDOT/NIVEL%20NACIONAL/MAE/ECOSISTEMAS/DOCUMENTOS/Sistema.pdf
41) GFW primary forest extent 30 % + canopy cover in the regions COTOPAXI, SANTO DOMINGO, PICHINCHA (not CAYAMBE), IMBABURA (not PIMAMPIRO), SANTO DOMINGO DE LOS TSACHILAS, ESMERALDAS, PEDERNALES
42) GFW primary forest extent 30 % + canopy cover in relevant regions.
43) GFW primary forest extent 30 % + canopy cover.
http://www.fao.org/3/a-az215f.pdf (page 17) indicate a rainforest cover of 81 293 km^2.
The entire French Guyana is covered by FAO's tropical rainforest ecozone.
44) GFW primary forest extent 30 % + canopy cover in the regions ITAPUA, GUAIRÁ, CAAZAPÁ, ALTO PARANÁ, CAAGUAZÚ, CANINDEYÚ, SAN PEDRO, AMAMBAY, CONCEPCIÓN, CORDILLERA
https://www.mdpi.com/1999-4907/8/10/389/htm (under the chapter «results»: 27 000 km^2 in 2000, lost 7 500 km^2 between 2000 and 2016).
The largest part of the Alto-Parana ecoregion that is defined as tropical rainforest lies in eastern Paraguay.
http://foris.fao.org/static/data/fra2010/ecozones2010.jpg
https://www.unep-wcmc.org/system/dataset_file_fields/files/000/000/301/original/Paraguay_brochure_ENG_150121.pdf?1423823959
https://www.mdpi.com/1999-4907/8/10/389/htm
45) Book: *National Forest Inventories: Assessment of Wood Availability and Use* redigert av Claude Vidal, Iciar A. Alberdi, Laura Hernández Mateo, John J. Redmond:
https://books.google.no/books?id=YbGVDQAAQBAJ&pg=PA124&lpg=PA124&dq=selva+misionera+argentina+extension&source=bl&ots=iD-0vUgwpls&sig=ACfU3U3Dv2L7oDe4dhTvKZNQmmB83z-FU5g&hl=no&sa=X&ved=2ahUKEwjZ8KysqKHpAhXhxaYKHXuSB-cEQ6AEwGnoECAkQAQ#v=onepage&q=selva%20misionera%20argentina%20extension&f=false (page 131) The data is from 2007, but there is very little deforestation of this type of forest in Argentina so it should be fairly accurate still. GFW primary forest includes parts of the Chaco forest that we have not been able to separate from the overall data. Argentina's tropical rainforest grows in two areas: Northern Argentina consists of the southernmost part of the Andean highland rainforest. This category includes three forest types, of which two do not fit the defition of a tropical rainforest. The category «selva pedemontana» grows up until 900 masl and receives most of its rain during 6 months or less. This is a typical monsoon forest and a transition forest between rainforest and dry Chaco forest. The forest that grows between 900 and 1600 masl is a frost free broadleaved forest that is dominated by tropical species. It is called «selva montana». Here it rains throughout the year at it's characteristics fits well with a tropical rainforest definition. This forest type has a much higher biodiversity than the two other forest types in this area. The forest that grows above 1600 masl is a subtropical clod forest and is called «bosque montano». It receives regular frost and is dominated by frost tolerant species like conifers. Argentina also has a part of the tropical rainforest that grown in the Alto Parana ecoregion. It is known in Argentina as "Selva Misionera". Much of this region, though, is too dry or too cold to sustain a tropical rainforest. According to FAO, the forest in and around Iguazu is tropical rainforest. We have not found separate data for this forest in Argentina so we have used the forest categories in the report of "Iguazu" and "closed canopy foest". We have excluded mixed forest and open canopy forest.
https://www.redalyc.org/pdf/540/54026849005.pdf (page 54-55) Shows that it has not been much change in the extent of "Selva Montana" and "Bosque Montano" from 2012.
https://www.worldwildlife.org/ecoregions/nt0150
https://www.researchgate.net/publication/297403547_Bosques_nublados_del_neotropico_Argentina
http://proyungas.org.ar/wp-content/uploads/2014/12/SelvaPedemontanadelasYungas.pdf
https://www.researchgate.net/profile/Lucio_Malizia/publication/237467584_Reserva_de_la_Biosfera_de_las_Yungas_armando_el_rompecabezas_entre_todos/links/55d49a7808ae6788fa35203e/Reserva-de-la-Biosfera-de-las-Yungas-armando-el-rompecabezas-entre-todos.pdf
46) GFW primary forest cover 30 % + canopy cover.
Mexico uses the definition «Selva Perennifolia» which is an evergreen broadleaved forest. Under this category there is also semi-evergreen forests(subperennifolia) where as much as 25 % of the trees shed the leaves during the drier season. Mexico has more than 18 000 km^2 of could forest. We have not found data that separate tropical from temperate cloud forests.
http://www.fao.org/3/a-az275s.pdf (page 24-25)
GFW primary forest cover 30 % + canopy cover for 2010 fits very well with official data for selva perennifolia in 2010.
http://bioteca.biodiversidad.gob.mx/janium/Documentos/6529.pdf
http://bioteca.biodiversidad.gob.mx/janium/Documentos/6515.pdf
https://www.biodiversidad.gob.mx/ecosistemas/bosqueNublado
http://www.biodiversidad.gob.mx/ecosistemas/ecosistemas.html
https://blog.globalforestwatch.org/people/30-years-forest-protection-yucatan-peninsula

47) GFW primary forest cover 30 % + canopy cover in relevant regions.
48) GFW primary forest cover 30 % + canopy cover.
Forest data for Panama varies greatly in different FAO-reports. To compare GFW primary forest cover with official data we have used the Forest Resource Assessment report from 2010, which has data from 2008 and is the most conservative estimate of forest cover in the country. We have subtracted the dry forest area estimate in the azuero earth project research from 2009. This indicates a tropical rainforest area of about 30 000 km². This fits well with GFW primary forest cover 2010. GFW primary forest cover also fits well with FAO's ecozone of tropical rainforest.
http://www.fao.org/docrep/013/al595S/al595S.pdf (page 8)
https://azueroearthproject.org/wp-content/uploads/2012/12/A.D0007_Portillo_2009_eng.pdf (page 7) http://www.fao.org/3/a-az302s.pdf (page 26-27) tropical rainforest in 1992 covered 42 249 km².
https://prezi.com/xqgn-sdoudqc/bosques-tropicales-en-panama/
https://www.gacetaoficial.gob.pa/pdfTemp/28229_A/GacetaNo_28229a_20170303.pdf
https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=12&ved=0ahUKEwiqx-um96_bAhWhJJoKHR9DCm8QFghVMAs&url=https%3A%2F%2Fwww.unredd.net%2Findex.php%3Fview%3Ddownload%26alias%3D14899-superficie-bosco-sa-y-tasa-de-deforestacion-en-panama%26category_slug%3Dsistema-satelital-monitoreo%26option%3Dcom_docman%26Itemid%3D134&usg=AOvVaw2jPdRikvOz6qoxvhTwcosa
49) GFW primary forest cover 30 % + canopy cover in relevant regions.
50) GFW primary forest cover 30 % + canopy cover in relevant regions.
51) GFW primary forest cover 30 % + canopy cover.
http://www.fao.org/3/a-az228s.pdf (page 10) data from 2003 include mixed forests which are not rainforests. Guatemala differs between leaved forests and conifer forests. The latest official data of leaved forest cover are from 1999. This fits well with GFW primary forest cover. GFW primary forest cover also fits well with FAO's tropical rainforest ecozone.
http://www.fao.org/3/ad402s/AD402s08.htm (Bosques de Latifoliadas 28 346 km² in 1999)
https://www.worldwildlife.org/ecoregions/nt0303
http://www.infoiarna.org.gt/recursos-informativos/publicaciones/?_sft_serie=serie-perfil-ambiental-de-guatemala
https://web.archive.org/web/20090510073911/http://www.usaid.gov/gt/docs/tropical_forrest_assesment.pdf
http://www.uvg.edu.gt/investigacion/ceab/cea/doc/informe-cobertura-forestal-2010.pdf (page 10)
http://www.uvg.edu.gt/investigacion/ceab/cea/doc/otras%20publicaciones/mapa_Dinamica_SIG91-01.pdf
https://www.guateambiente.org/estado-actual-de-los-bosques-en-guatemala/
52) GFW primary forest cover 30 % + canopy cover in relevant regions.
53) GFW primary forest cover 30 % + canopy cover.
Mapa Forestal y de Cobertura de la Tierra de Honduras: Análisis de Cifras Nacionales, Nota Técnica Nº 08, page 17 - "bosque latifoliado humedo" = 25 787 km² in 2014.
http://www.reddccadgiz.org/documentos/doc_1697518440.pdf
In the report "Evaluacion Nacional Forestal" from 2006 page 34, official data estimate a tropical rainforest cover of 25 589 km²:
https://books.google.no/books?id=uUq0g3J5rngC&pg=PA34&lpg=PA34&dq=tipo+de+bosques+honduras&source=bl&ots=WcbijU5ZC8&sig=ACfU3U1qJ-GgRibAm26JE7g-adHjdqT8Og&hl=no&sa=X&ved=2ahUKEwiAnc6z0rPpAhVMl4sKHe08CvAQ6AEwG3oECAgQAQ#v=onepage&q&f=false
In Honduras' official data to FAO and in the Forest Reference Level Honduras 2020 (page 6) - bosque latifoliado húmedo is estimated to cover more than 31 000 km² in 2019 and more than 37 000 km² in 2009. This is possibly due to a canopy cover threshold of 10 % and that it includes deforested and regrowing forest:
https://redd.unfccc.int/files/nrf_2020_honduras.pdf
http://www.fao.org/3/a-az235s.pdf (page10, «bosque latifoliado")
54) GFW primary forest cover 30 % + canopy cover in relevant regions.
55) GFW primary forest cover 30 % + canopy cover.
In «Inventario Nacional Forestal de Nicaragua 2010» page 69 it is explained that Nicaragua classifies its forests as leaved forest (bosque latifoliado), conifer forests (conifero), and mixed forests (mixto) and mangrove forests (manglar). The leaved forest consists of both rainforest and dry forest. In FREL 2019 there is a distinction between «bosque latifoliado» og «bosque seco» (dry forest). Total forest area of the former was 28 871 km² in 2015. Lots of secondary regrowing forest.
https://redd.unfccc.int/files/nref_nacional_vf_170119.pdf
http://www.marena.gob.ni/Endereddd/wp-content/uploads/MemoriasOrganizados/Investigaciones/Atlas.pdf http://riul.unanleon.edu.ni:8080/jspui/retrieve/4149
https://publications.iadb.org/publications/spanish/document/Diagn%C3%B3stico_del_sector_forestal_en_Nicaragua_Movilizando_el_sector_forestal_y_atrayendo_inversiones_es_es.pdf
http://www.fao.org/3/a-az291s.pdf
56) GFW primary forest cover 30 % + canopy cover in relevant regions.
57) GFW primary forest cover 30 % + canopy cover in relevant regions.
58) GFW primary forest cover 30 % + canopy cover.
http://www.fao.org/3/a-az191s.pdf (page 19) «bosque maduro» and «bosque secundario» = 23 216 km² in 2013.
Just about all forest in Costa Rica grows within FAO's tropical rainforest ecoregion. There are some dry forests northwest in the country. The category «bosque maduro» represents primary rainforest. This is at least 75 years old and has to a very little degree been modified by humans. Most is locaed in protected areas. The area of «bosque maduro» and GFW primary forest cover are similar. Costa Rica also has substantial areas of secondary regrowing forests.
https://rainforests.mongabay.com/deforestation/archive/Costa_Rica.htm
https://unredd.net/index.php?option=com_docman&task=doc_download&gid=13242&Itemid=53
https://www.sirefor.go.cr/pdfs/afiche_Inventario_Forestal_Nacional.pdf
https://www.researchgate.net/figure/Figure1-Ecoregions-used-for-macroecological-analyses-in-the-Costa-Rica-Panama-Colombia_fig1_233399299
59) GFW primary forest cover 30 % + canopy cover in relevant regions.
60) GFW primary forest cover 30 % + canopy cover.
http://www.fao.org/3/a-az165e.pdf (page 9) 2010 data.
61) GFW primary forest cover 30 % + canopy cover.
https://www.globalspecies.org/ecoregions/display/OC0106
62) GFW primary forest cover 30 % + canopy cover.
http://www.fao.org/3/a-az205s.pdf (page 8) 329 km² in 2002.
63) GFW primary forest cover 30 % + canopy cover.
http://www.joeroman.com/wordpress/wp-content/uploads/2018/02/galford-et-al-2018.pdf - "Cuban land use and conservation, from rainforests to coral reefs" 2018 (page 3 and 8) indicate 12 668 km² of wet forest on Cuba in 2015. This deviates greatly from GFW primary forest cover and is probably due to that Cuba has lots of seconary young regrowing forest.
https://www.worldwildlife.org/ecoregions/nt0120
http://documents.worldbank.org/curated/en/957541468270313045/pdf/multi-page.pdf
64) GFW primary forest cover 30 % + canopy cover.
http://www.fao.org/3/a-az202s.pdf (page11), «bosque latifoliado humedo», «bosque latifoliado nublado», and «bosque latifoliado semi-humedo» combined cover an area of 10 187 km² in 2012. The big deviation from GFW primary forest cover is probably due to extencive areas of secondary young regrowing forest.
http://www.grupojaragua.org.do/documents/Informe_MonitoreoBicknell_BahorucoS_GJ2012-2013_conResumen_ed.pdf
http://tareasdominicanas.com/bosques-la-republica-dominicana/
65) GFW primary forest cover 30 % + canopy cover.
http://www.fao.org/3/a-az246e.pdf (page 9) Closed broadleafed, disturbed broadleaf, mangrove, and swamp estimated area of 2 693 km² in 2010. Most of Jamaica is within FAO's tropical rainforest ecozone.
http://www.forestry.gov.jm/node/386
66) GFW primary forest cover 30 % + canopy cover.
http://www.fao.org/3/a-az356e.pdf (page 11-12) Evergreen and semi-evergreen seasonal forest, montane forest swamp forest = 1 263 km² in 2010.
67) GFW primary forest cover 30 % + canopy cover.
http://www.fao.org/3/a-az310e.pdf (page 13) Subtropical rainforest, subtropical moist forest, Lower montain rainforest and mangrove forest combined area of 4 192 km² in 2008. Lots of young secondary forest. The entire island lies within FAO's tropical rainforest ecozone.
68) GFW primary forest cover 30 % + canopy cover.
http://www.fao.org/3/a-az226f.pdf (page 10) Forêt ombrophile = 360 km² in 2010.
69) GFW primary forest cover 30 % + canopy cover.
GFW primary forest samsvarer med myndighetenes 2010 tall i country report fao 2015.
http://www.fao.org/3/a-az201e.pdf (page 12)
70) GFW primary forest cover 30 % + canopy cover.
The region Haut-Katanga in the south has about 11 km² of GFW primary forest cover. This is part of the «Miombo Woodland» and is not rainforest. Data on rainforest cover in DRC varies a lot. According to DRC's FREL from 2018 DRC had 1 145 260 km² of rainforest in 2009.
https://redd.unfccc.int/files/rdc_documentnerf_soumissionfinale_29112018.pdf
https://www.observatoire-comifac.net/docs/edf2010/FR/Etat-des-forets_2010.pdf
At the same time, official data from 2005 indicate a rainforest area of 987 000 km²: http://www.fao.org/3/a-az198f.pdf (page 12). The large deviation may be due to that the former include secondary young regrowing forest, as the same report estimates a secondary forest area of 182 930 km² in DRC. This is forest that has been either completely removed and is in a state of regrowing or has the potential to regrow.
The Royal Society report indicate a rainforest area in DRC of 1 071 810 km² in 2005 canopy cover 70 % +:
https://royalsocietypublishing.org/doi/pdf/10.1098/rstb.2012.0300 (page 4)
https://carpe.umd.edu/sites/default/files/focb_aprelimassess_en.pdf
71) GFW primary forest cover 30 % + canopy cover.
Total forest cover in Gabon in 2015 = 229 700 km²:
http://www.fao.org/3/a-az217f.pdf (page 12-13).
Royal Society report indicate a rainforest cover of 224 160 km² in 2005 canopy cover 70 % +:
https://royalsocietypublishing.org/doi/pdf/10.1098/rstb.2012.0300 (page 4)
72) GFW primary forest cover 30 % + canopy cover.
Official data indicates 217 895 km² in 2012:
http://www.fao.org/3/a-az189f.pdf (page 11-12)
Royal Society report indicate 209 320 km² in 2005 canopy cover 70 % +:
https://royalsocietypublishing.org/doi/pdf/10.1098/rstb.2012.0300 (page 4)
73) GFW primary forest cover 30 % + canopy cover.
Official data indicate a rainforest area of 191 043 km² in 2004.
http://www.fao.org/3/a-az180f.pdf (page 8).
Royal Society report = 200 370 km² in 2005, 70 % + canopy cover:
https://royalsocietypublishing.org/doi/pdf/10.1098/rstb.2012.0300 (page 4)
74) GFW primary forest cover 30 % + canopy cover.
Verhegghen & Defourny, 2010, rainforest cover = 69 237 km²:

https://www.observatoire-comifac.net/docs/edf2010/FR/Etat-des-forets_2010.pdf
Royal Society report = 58 330 km² in 2005 canopy cover 70 % +:
https://royalsocietypublishing.org/doi/pdf/10.1098/rstb.2012.0300 (page 4).
Official data from 1989: http://www.fao.org/3/a-az183f.pdf (page 11) = 32 732 km² of dense primary and secondary forest.
75) GFW primary forest cover 30 % + canopy cover.
http://www.fao.org/3/a-az259e.pdf (page 11 and 17)
Total forest cover 2015 = 41 000 km². The entire country lies within FAO's tropical rainforest zone. http://www.fao.org/forestry/country/61326/en/lbr/
Some consist of areas that has 50 % of agricultural land (page 11 in the fao-report). Rainforest, both degraded and relatively intact that is not part of the forest/agricultural mosaic landscape covers an area of 34 555 km² in 2003.
Royal Society report indicates a rainforest area of 45 520 km² in 2005 canopy cover 70 % +:
https://royalsocietypublishing.org/doi/pdf/10.1098/rstb.2012.0300 (page 4)
https://www.worldwildlife.org/ecoregions/at0130
76) GFW primary forest cover 30 % + canopy cover.
Official rainforest data for the year 2010 = 46 582 km²:
http://www.fao.org/3/a-az264f.pdf (page 8)
77) GFW primary forest cover 30 % + canopy cover.
Verhegghen & Defourny, 2010 indicate a rainforest area of 21 206 km² in 2010:
https://www.observatoire-comifac.net/docs/edf2010/FR/Etat-des-forets_2010.pdf (page 29)
Royal Society report indicates a rainforest area of 21 630 km² in 2005:
https://royalsocietypublishing.org/doi/pdf/10.1098/rstb.2012.0300 (page 4)
FREL Equatorial Guinea 2020 indicates a rainforest area of 24 278 km² in 2018. This includes secondary forest:
https://redd.unfccc.int/files/eg_frlsubmissions_2020_01_13.pdf (page 45-46)
78) GFW primary forest cover 30 % + canopy cover in Cabinda, Zaire, Uige, Bengo, Cuanza Norte, Malanje, Luanda, Cuanza Sul, Benguela.
We have not included GFW tropical primary forest that is located outside of FAO's tropical rainforest ecozone. This is I n the eastern parts of the country.
About all forest in Cabinda belongs to the Central Acrifan rainforest biome. In the rest of Angola there are rainforest areas spread out on hilltops in the north. Angola forms part of the Southern Congolian Forest-Savanna Mosaic and western congolian forest-savanna mosaic, which can sistain both savannas and rainforest. According to FAO, large parts of northern Angola lies within the tropical rainforest ecozone.
https://globalforestatlas.yale.edu/congo/ecoregions/congo-basin-ecoregion
https://www.worldwildlife.org/ecoregions/at0718
https://www.worldwildlife.org/ecoregions/at1001
https://link.springer.com/chapter/10.1007/978-3-030-03083-4_2
https://phytokeys.pensoft.net/article/8679/
https://www.cambridge.org/core/journals/bird-conservation-international/article/namba-mountains-new-hope-for-afromontane-forest-birds-in-angola/A18319114AABB9B43991022AFD41B31A
https://www.researchgate.net/figure/A-Location-of-Angola-in-Africa-B-Location-of-Cuanza-Norte-in-Angola-C-Vegetation_fig1_319314405
http://www.fao.org/forestry/country/61326/en/ago/
79) GFW primary forest cover 30 % + canopy cover.
Ethiopia's «moist afromontane biome» = 85 000 km². This is an evergreen moist forest where some trees shed their leaves during the drier season.
https://redd.unfccc.int/files/ethiopia_frel_3.2_final_modified_submission.pdf (page 20 og 65).
http://www.ebi.gov.et/biodiversity/ecosystems-of-ethiopia/montane-moist-forest-ecosystem/
https://theecologist.org/2016/mar/24/ethiopias-vulnerable-tropical-forests-are-key-securing-future-coffee
https://knowledge.unccd.int/sites/default/files/inline-files/ethiopia-ldn-country-report-final.pdf
http://redd.unfccc.int/files/ethiopia_frel_3.2_final_modified_submission.pdf (page 19)
80) GFW primary forest cover 30 % + canopy cover.
Royal Society report indicates a rainforest area of 31 580 km² in 2005:
https://royalsocietypublishing.org/doi/pdf/10.1098/rstb.2012.0300 (page 4)
https://www.researchgate.net/figure/Map-of-Nigeria-showing-the-rain-forest-and-the-locations-representative-pedons-color_225285508
http://www.itto.int/sfm_detail/id=12350000
181) GFW primary forest cover 30 % + canopy cover.
Royal Society report indicates a rainforest area of 15 300 km² in 2005:
https://royalsocietypublishing.org/doi/pdf/10.1098/rstb.2012.0300 (page 4)
FREL 2018, forêt dense tropicale + forêt décidue humide tropicale (semi decidious) = 18 350 km² in 2000:
https://redd.unfccc.int/files/01_01_2017_rci_nerf_version_finale.pdf
https://www.worldwildlife.org/ecoregions/at0130
http://www.fao.org/3/a-az192f.pdf
https://www.worldwildlife.org/ecoregions/at0130
82) GFW primary forest cover 30 % + canopy cover.
Royal Society report indicates a rainforest area of 14 870 km² in 2005:
https://royalsocietypublishing.org/doi/pdf/10.1098/rstb.2012.0300 (page 4)
https://redd.unfccc.int/files/ghana__modified_frl_november_10_2017_clean.pdf
https://eros.usgs.gov/westafrica/land-cover/deforestation-upper-guinean-forest
83) GFW primary forest cover 30 % + canopy cover.
Most of Tanzania's rainforest grows in the «Eastern Arc Mountains». This a highland rainforest with an estimated extent of 5 340 km² in 1998:
http://www.bioone.org/doi/pdf/10.2982/0012-8317(1998)87%5B29:FAFAL-I%5D2.0.CO%3B2
http://www.afrizap.com/en/east-africa-rainforest
https://www.worldwildlife.org/ecoregions/at0109
http://easternarc.or.tz/eastern-arc-mountains/index.html
https://www.mountkilimanjaroguide.com/kilimanjaro-facts.html
https://earthobservatory.nasa.gov/IOTD/view.php?id=89605
84) GFW primary forest cover 30 % + canopy cover.
Kenya has around 200 km² of tropical lowland rainforest (Imatong). The rest is highland rainforest. Kenya operates with a forest category called Montane and western rainforest in FREL 2019. Official data estimates an extent of 10 066 km² of this forest type in 2018. But this includes conifer forests that grow on the western sides of the mountains and at higher altitudes:
https://redd.unfccc.int/files/national_frl_report_for_redd__in_kenya.pdf (page 31 and 82)
http://www.helsinki.fi/science/taita/reports/Peltorinne_Forest_types.pdf
https://softkenya.com/kenya/south-nandi-forest/
http://datazone.birdlife.org/site/factsheet/south-nandi-forest-iba-kenya/text
http://datazone.birdlife.org/site/factsheet/north-nandi-forest-iba-kenya
https://www.worldwildlife.org/ecoregions/at0108
https://www.globalspecies.org/ecoregions/display/AT0108
85) GFW primary forest cover 30 % + canopy cover.
Tis report from 2006 indicates a rainforest cover of 9 242 km²:
http://www.vub.ac.be/klimostoolkit/sites/default/files/documents/uganda_biodiversity_assessment_usaid.pdf (page 14)
http://www.fao.org/3/a-az362e.pdf page 13, rainforest cover in 2005 = 7 752 km²
86) GFW primary forest cover 30 % + canopy cover.
We have not found any other reliable data on rainforest cover in the country. All Upper Guinean Forest is rainforest, but almost all is heavily degraded.
https://www.researchgate.net/publication/332963336_What_Happened_to_the_Forests_of_Sierra_Leone
https://eros.usgs.gov/westafrica/land-cover/deforestation-upper-guinean-forest
https://www.worldwildlife.org/ecoregions/at0130
87) GFW primary forest cover 30 % + canopy cover.
We have not found any other reliable data on rainforest cover in the country.
https://www.worldwildlife.org/ecoregions/at0130
https://eros.usgs.gov/westafrica/land-cover/deforestation-upper-guinean-forest
88) GFW primary forest cover 30 % + canopy cover.
Mozambique's rainforest grows along parts if the coast and in some mountain areas in the north.
https://www.theguardian.com/world/2018/jun/17/mozambique-mount-lico-rainforest-new-species
https://qz.com/africa/1320464/scientists-find-mozambiques-untouched-rainforest-on-top-of-an-african-mountain/
http://www.africancuckoos.zoo.cam.ac.uk/downloads/Oryx_Bayliss2014.pdf
http://blogs.wwf.org.uk/blog/habitats/forests/scientist-discovers-a-new-rain-forest-in-mozambique/
89) GFW primary forest cover 30 % + canopy cover.
Highland rainforest in the Imatong.
http://www.fao.org/tempref/docrep/fao/010/ah887e/ah887e00.pdf
https://www.worldatlas.com/articles/ecological-regions-of-south-sudan.html
There are some lowland rainforest in what is called «Woodland Savannah Recently Derived from Rain Forest»: https://www.researchgate.net/publication/311390991_Ecological_Zones_of_the_Sudan
https://news.mongabay.com/2011/06/south-sudans-tropical-forests-fast-disappearing/
90) GFW primary forest cover 30 % + canopy cover.
91) GFW primary forest cover 30 % + canopy cover.
92) GFW primary forest cover 30 % + canopy cover.
Togo has only 13 km² of rainforest left.
https://www.encyclopedia.com/places/africa/togo-political-geography/togo#FLORA_AND_FAUNA
93) GFW primary forest cover 30 % + canopy cover.
https://www.britannica.com/place/Benin
94) GFW primary forest cover 30 % + canopy cover = 50 km²
http://www.malawi-info.net/country/article/525/malawi-forest-reserves
http://www.birdlife.no/internasjonalt/nyheter/?id=1841
95) GFW primary forest cover 30 % + canopy cover 2018 = 387 km². But with canopy cover at 75 % it is reduced to about 100 km². The area has a yearly precipitation of 800 to 1250 mm. WWF defines this area as «dry evergreen forest». It has two dry seasons, from August to October, and from May to July – 6 months in total. This is a mixed forest of rainforest plants, dry woodland plants and savanna plants.
https://www.worldwildlife.org/ecoregions/at0203
Zambian authorities also defines this forest as «dry evergreen woodland/forest":
http://zmb-nfms.org/iluaii/images/technical_docs/1.-CLASSIFICATION-OF-ZAMBIAN-FORESTS.pdf
http://zmb-nfms.org/iluaii/images/technical_docs/1.-CLASSIFICATION-OF-ZAMBIAN-FORESTS.pdf
https://www.researchgate.net/publication/232004223_Species_structure_in_Zambian_Miombo_Woodland
https://www.youtube.com/watch?v=QbdCVc-8rIY

96) GFW primary forest cover 30 % + canopy cover.
Total forest area official data 2015 = 860 640 km². By subtracting the dry forest areas it is 853 525 km² in 2015. GFW primary forest cover for 2015 = 861 700 km².
http://www.fao.org/3/a-az239e.pdf (page 27)
Alpine forest: The Ecology of Papua: https://books.google.no/books?id=Ix-DRAgAAQBAJ&pg=PT611&lpg=PT611&dq=mangrove+forests+papua+indonesia&source=bl&ots=bbgtbIIGvh&sig=IOvQOGk3Eqsazehg-7an-QUhBRm4&hl=no&sa=X&ved=0ahUKEwjM05G60ebaAhUDhiwKHRv_AeE4ChDoAQgyMAM#v=onepage&q&f=false
«Sumatra tropical pine forest» https://www.worldwildlife.org/ecoregions/im0304
http://wwf.panda.org/what_we_do/where_we_work/borneo_forests/about_borneo_forests/ecosystems/montane_forests/
97) GFW primary forest cover 30 % + canopy cover in relevant regions.
98) GFW primary forest cover 30 % + canopy cover in relevant regions.
99) GFW primary forest cover 30 % + canopy cover in relevant regions.
100) GFW primary forest cover 30 % + canopy cover in relevant regions.
101) GFW primary forest cover 30 % + canopy cover.
Official data on tropical wet evergreen forests, tropical semi evergreen forests and mangrove forests = 59 376 Km² in 2010. In addition, "hill and temperate evergreen forests" = 85 412 km². Much of the last category is in northern Myanmar where there are broadleved evergreen forests growing up until 1800 masl.
http://www.apafri.org/activities/Myanmar2015/Day%201/Day1_Nyi%20Nyi%20Kyaw_Forests%20and%20Forestry%20in%20Myanmar.pdf (slide 16)
There are 8 eco regions in Myanmar that sustain tropical rainforest.
https://www.worldwildlife.org/ecoregions/im0402
https://www.worldwildlife.org/ecoregions/im0140
https://www.worldwildlife.org/ecoregions/im0131
https://www.worldwildlife.org/ecoregions/im0109
https://www.worldwildlife.org/ecoregions/im0132
https://www.worldwildlife.org/ecoregions/im0119
https://www.worldwildlife.org/ecoregions/im0163
https://www.worldwildlife.org/ecoregions/im1404
https://redd.unfccc.int/files/revised-myanmar_frl_submission_to_unfccc_webposted.pdf (page 13)
http://unosat-maps.web.cern.ch/unosat-maps/MM/OT20150413MMR/UNOSAT_A3_OT20150413MMR_LandClassification_2000_Rakhine.pdf
http://www.awg-sf.org/myanmar/
https://www.ifc.org/wps/wcm/connect/deffc348-3773-4fcf-a298-281c53d-1cdd1/3c+SEA+Biodiversity%2C+hydro+and+climate+change+presentation.pdf?MOD=AJPERES&CVID=lDuVkbY
https://www.researchgate.net/publication/240614379_Land_use_in_the_Northern_Forest_Complex_of_Myanmar_Burma_-_new_insights_for_conservation
http://www.fao.org/forestry/country/61326/en/mmr/
102) GFW primary forest cover 30 % + canopy cover in relevant regions.
103) GFW primary forest cover 30 % + canopy cover.
http://www.fao.org/3/a-az266e.pdf, page 19, total forest area = 202 290 km².
Official data from 2001 indicate a forest area of 177 700 km²:
http://www.eorc.jaxa.jp/ALOS/kyoto/mar2012_kc17/pdf/2-6_kc17_hamdan-omar_frim.pdf (page 3)
https://www.biogeosciences.net/8/2635/2011/bg-8-2635-2011.pdf
http://whrc.org/wp-content/uploads/2016/02/Forest-Inventory-in-Malaysia.pdf
https://www.worldatlas.com/articles/ecological-regions-of-malaysia.html
https://en.wikipedia.org/wiki/List_of_ecoregions_in_Malaysia#cite_note-Panda-6
104) GFW primary forest cover 30 % + canopy cover in relevant regions.
105) GFW primary forest cover 30 % + canopy cover in relevant regions.
106) GFW primary forest cover 30 % + canopy cover. We have subtracted GFW primary forest cover in the regions Odisha, Adhra Pradesh, and parts of the region Tamil Nadu that lies in the Western Ghats, which according to WWF is moist deciduous forests.
https://www.worldwildlife.org/ecoregions/im0111
https://www.worldwildlife.org/ecoregions/im0150
The following report indicates a rainforest area in India of 95 487 km² in 2015: https://www.ncbi.nlm.nih.gov/pubmed/26615560 - Tropical Wet Evergreen and Tropical Semi-Evergreen.
http://www.biologydiscussion.com/forest/5-types-of-forests-found-in-india-explained/6940
https://nrsc.gov.in/Forest_Types?q=Land_Cover_NICES
107) GFW primary forest cover 30 % + canopy cover in relevant regions.
Arunachal Pradesh lies in Asia's northern limit of frost free areas. Official data indicates a combined area of "tropical wet forest» and "tropical semi-evergreen forest» of 47 147 km² – 70 % of the total forest cover in the region in 2007: http://fsi.nic.in/sfr2009/arunachal_pradesh.pdf page 61.
Forest types in Arunachal Pradesh: http://arunachalforests.gov.in/notifications/Forest_statistics%20of%20Arunachal%20Pradesh-2017.pdf page 10
http://fsi.nic.in/isfr19/vol2/isfr-2019-vol-ii-arunachal-pradesh.pdf
108) GFW primary forest cover 30 % + canopy cover.
Official data of «evergreen forest» = 26 056 km² in 2015. «Mixed deciduous forest» og «coniferous forests» combined cover 94 000 km², of which most id «mixed deciduous forest»:
https://redd.unfccc.int/files/lao_2018_frel_submission_modified.pdf page 5.
http://www.rfo-sea.org/national_summary.htm
http://www.fao.org/forestry/country/61326/en/lao/
«Mixed deciduous forest» is a forest type that consists of semi-evergreen moist forests and conifer forests. It is likely that GFW primary forest cover for Laos includes the parts of the forest type that is more similar to «tropical semi-evegreen moist forest». GFW primary forest cover dos not overlap with WWF's ecozone called «central indochina dry forest», which is the only forest zone of the country that do not sustain rainforest in any way. There are five other eco regions in the country that do sustain a rainforest environment:
https://www.worldwildlife.org/ecoregions/im0137
https://www.worldwildlife.org/ecoregions/im0121
https://www.worldwildlife.org/ecoregions/im0136
https://www.worldwildlife.org/ecoregions/im0152
https://www.worldwildlife.org/ecoregions/im0210
http://portal.gms-eoc.org/uploads/map/archives/map/GMS-Ecoregions_18_hi-res_10.jpg
https://books.google.no/books?id=PQ8NHpLPb70C&pg=PT257&lpg=PT257&dq=mixed+deciduous+forests+laos&source=bl&ots=GAaNAUKBw4&sig=ACfU3U2EwECTzfJqtIFW_2kZjdcvieKcwg&hl=no&sa=X&ved=2ahUKEwj2u8e4ntHpAhXG0qYKHQ8kBu0Q6AEwEHoECAoQAQ#v=onepage&q=mixed%20deciduous%20forests%20laos&f=false (chapter 3.3).
http://www.mekonginfo.org/assets/midocs/0001714-environment-forests-and-trees-of-the-central-highlands-of-xieng-khouang-lao-p-d-r-a-field-guide.pdf
http://www.fao.org/3/a-az255e.pdf
109) GFW primary forest cover 30 % + canopy cover.
https://www.worldwildlife.org/ecoregions/im0137
National Forest Inventory and Statistics (NFIS) indicates a total evergreen forest cover, including mangroves, of 72 240 km² in 2016, and a secondary forest cover of 41 050 km²: http://www.rfo-sea.org/national_summary.htm.
The FREL 2016 indicates an area of 77 320 km² for the same forest type in 2010.
https://redd.unfccc.int/files/vietnam_frl_modified__submission_final_for_posting.pdf
http://www.mekonginfo.org/assets/midocs/0002503-environment-forest-resources-management-and-development-in-vietnam.pdf page 1, Department for Forestry Development Closed broad-leaved tropical evergreen and semi-deciduous 56 486 km².
110) GFW primary forest cover 30 % + canopy cover.
Includes parts of "Southeastern Indochina Dry Evergreen Forests": https://www.worldwildlife.org/ecoregions/im0210. Annual precipitation varies from 1200 mm to 2000 mm and with a dry season of 3-6 months. This is semi-evergreen forest and parts of it can be defined as tropical rainforest. GFW primary forest cover fits well with FAO's delimitation of the tropical rainforest ecozone.
Official data indicates a tropical evergreen forest cover of 52 198 km² in 1998:
http://www.fao.org/3/ac648e0a.htm
http://portal.gms-eoc.org/maps?cmbIndicatorMapType=archive&cmbIndicatorTheme=35&cmbIndicatorMap=10
http://portal.gms-eoc.org/uploads/map/archives/lores/GMS-Ecoregions_18_Lo-Res_18_lo-res_10.jpg
https://wildlifethailand.com/blog-posts/plants-and-fungi/96-forest-types-in-thailand
http://forprod.forest.go.th/forprod/ebook/%E0%B8%81%E0%B8%B2%E0%B8%A3%E0%B8%9B%E0%B9%88%E0%B8%B2%E0%B9%84%E0%B8%A1%E0%B9%89%E0%B9%83%E0%B8%99%E0%B8%9B%E0%B8%A3%E0%B8%B0%E0%B9%80%E0%B8%97%E0%B8%A8%E0%B9%84%E0%B8%97%E0%B8%A2/Forest%20in%20thailand%20eng.pdf
http://www.fao.org/3/a-az350e.pdf
111) GFW primary forest cover 30 % + canopy cover.
Country report 2015 til FAO, Closed Forest Broadleaved and mangroves (40 % + canopy cover) = 22 010 km² in 2010, Open Broadleaved Forest = 43 110 km².
http://www.fao.org/3/a-az306e.pdf (page 21)
https://www.worldatlas.com/articles/ecological-regions-of-the-philippines.html
https://www.senate.gov.ph/publications/SEPO/AAG%20on%20Philippine%20Forest_Final.pdf
FAO's tropical rainforest ecoregion and GFW primary forest cover are similar.
112) GFW primary forest cover 30 % + canopy cover.
Includes parts of the eco region Southeastern Indochina Dry Evergreen Forests:
https://www.worldwildlife.org/ecoregions/im0210. Annual precipitation varies from 1200 mm to 2000 mm and with a dry season of 3-6 months. This is semi-evergreen forest and parts of it can be defined as tropical rainforest.
Official data of semi-evergreen, evergreen and mangrove forests to cover 41 050 km² in 2014:
http://www.rfo-sea.org/national_summary.htm
https://www.worldwildlife.org/ecoregions/im0202
http://www.fao.org/3/a-az179e.pdf
113) GFW primary forest cover 30 % + canopy cover.
http://sourcedb.xtbg.cas.cn/yw/ywlw/200908/P020090827560702877262.pdf fra page 1: *There are only about 633,800 ha of old growth high diversity lowland tropical rain forests in China today, and much of these old growth lowland tropical forests are located in Xishuangbanna of southern Yunnan Province.*
The frost free rainforest in China grows in southeastern Xizang (Tibet), southern Yunnan, southwestern Guangxi, Hainan and southern Taiwan:
https://www.researchgate.net/publication/315532056_The_Tropical_Forests_of_Southern_China_and_Conservation_of_Biodiversity
https://www.researchgate.net/figure/The-tropical-seasonal-rain-forest-in-southern-Yunnan-China_fig2_239839917
http://www.fao.org/forestry/country/61326/en/chn/
https://news.mongabay.com/2008/03/chinas-tropical-rainforests-decline-67-in-30-years/

https://news.mongabay.com/2015/07/rich-forest-diversity-found-in-new-yunnan-china-preserve/
http://en.people.cn/102775/208085/8364141.html
https://tropicalconservationscience.mongabay.com/content/v1/08-03-03-Hua.htm

114) GFW primary forest cover 30 % + canopy cover.
http://www.fao.org/3/a-az168e.pdf page 7, Broadleaf 16 890 km² in 2010.
http://www.rspnbhutan.org/flora-and-fauna-of-bhutan-2/
http://www.fao.org/forestry/country/61326/en/btn/
http://www.fao.org/3/ad103e/AD103E03.htm

115) GFW primary forest cover 30 % + canopy cover.
Classification of Nepalese Forests Classification of Nepalese Forests and Their Distribution in Protected Areas – 2008 – page 1-2:
Nepal lies just outside of the tropics in the global climatic zonation. However, bioclimatic tropicality extents into it up to an elevation of 1,000 m altitude.
http://www.floraofnepal.org/countryinformation/vegetation/stainton
http://www.fao.org/forestry/country/61326/en/npl/
http://www.fao.org/3/w7719e/w7719e04.htm
https://redd.unfccc.int/files/finalfrlnepal_jan2018.pdf
https://en.wikipedia.org/wiki/Geography_of_Nepal#/media/File:Land_cover_map_of_Nepal_using_Landsat_30_m_(2010)_data.jpg
http://www.fao.org/3/y1997e/y1997e1g.jpg
http://www.fao.org/forestry/country/61326/en/mmr/

116) GFW primary forest cover 30 % + canopy cover.
http://www.fao.org/3/a-az341e.pdf (page 8) «montane forest», sub-montane», «lowland rainforest», wet monsoon forest» and «mangrove forest» cover 3 145 km² in 2010. «wet monsoon» has up to 3 months of dry season. It borders the rainforest and the two forest types to not differ much. They have many of the same species. Sri Lanka also has over 11 000 km² of «dry monsoon forest». This receives up to 2000 mm of rain annually, and has a dry season of 3-6 months. Parts of this forest does also fit with a tropical rainforest definition.
http://lk.chm-cbd.net/?page_id=182
http://www.fao.org/3/a-az341e.pdf

117) GFW primary forest cover 30 % + canopy cover.
http://www.fao.org/3/a-az174e.pdf (page 15) total forest cover 2015 = 3 770 km².

118) GFW primary forest cover 30 % + canopy cover in Pingtung and Taitung. The tropical zone in Tawain is far south in the country. This is a tropical monsoon forest type similar to the one in southern China.
https://link.springer.com/article/10.1007/s11258-009-9694-0
https://www.worldwildlife.org/ecoregions/im0171
https://www.researchgate.net/publication/315532056_The_Tropical_Forests_of_Southern_China_and_Conservation_of_Biodiversity

119) GFW primary forest cover 30 % + canopy cover.
http://www.fao.org/3/a-az161e.pdf (Page 25) Forest defined as «Hill forest» is the only tropical rainforest left in the country, about 920 km² in 2005.
https://www.usaid.gov/sites/default/files/documents/1865/Bangladesh-Tropical-Forests-and-Biodiversity-Assessment-2016.pdf
https://books.google.no/books?id=ydiZGNfoBtwC&pg=PA5&lpg=PA5&dq=tropical+rainforest+bangladesh&source=bl&ots=qraLz252cu&sig=CegeO8TF0CJAGig65aOxANzG-CY&hl=no&sa=X&ved=0ahUKEwj3keLSuoLcAhWOK1AKHadFB3g4HhDoAQguMAE#v=onepage&q=tropical%20rainforest%20bangladesh&f=false
http://iopscience.iop.org/article/10.1088/1748-9326/aa84bb/meta
http://en.banglapedia.org/index.php?title=Forest_and_Forestry

120) GFW primary forest cover 30 % + canopy.
FREL 2017 estimate «swamp forests», «Mangrove forests», «Low altitude forest on plains and fans», «Low altitude forest on uplands», and «Lower montane forest», to cover a total area of 308 321 km² in 2015. Forest above 3000 masl («Montane forest») = 3 948 km²
https://redd.unfccc.int/files/png_frl__submission-15.01.2017.pdf page 19.
https://pharmacy.utah.edu/ICBG/pdf/WebResources/ForestBiodiversity/Shearman-State-of-the-Forests-of-PNG-2008.pdf (page 13) «lowland rainforest», «lower montane forest», «swamp forest» and «mangrove forest» cover an estimate area of 316 955 km² in 2002.
http://www.fao.org/3/a-az303e.pdf - details for forest types only for the year 1996.

121) GFW primary forest cover 30 % + canopy: Bougainville, Milne Bay, New Britain, New Irland, Manus.

122) GFW primary forest cover 30 % + canopy.

123) GFW primary forest cover 30 % + canopy.
http://www.fao.org/3/a-az336e.pdf (page 16-17) total forest cover 2015 = 21 581 km²
http://mofr.gov.sb/foris/forestArea.do#marker
https://www.researchgate.net/publication/9043600_Rainforest_Composition_and_Histories_of_Human_Disturbance_in_Solomon_Islands
http://www.fao.org/3/a-am626e.pdf
https://www.worldwildlife.org/ecoregions/aa0119
https://www.jstor.org/stable/2416853?seq=1#page_scan_tab_contents

124) GFW treecover in natural forest areas of minimum 30 % in the tropical rainforest areas of Queensland defined by WWF: https://www.worldwildlife.org/ecoregions/aa0117
We have subtracted the tree cover in plantations (in Rockhampton, Isaac, Hinchinbrook, Cassowary Coast, Cairns) from the general tree cover data. Total plantations 355 km². Almost all tree cover loss happened in natural forests.
Link to selected area:
https://www.globalforestwatch.org/map/geostore/8ad50371c6fac1f-7b2540c598c87c51b?analysis=eyJzaG93RHJhdyI6dHJ1ZX0%3D&mainMap=eyJzaG93QW5hbHlzaXMiOnRydWUsImhpZGVMZWdlbmQiOmZhbHNlfQ%3D%3D&map=eyJjZW50ZXIiOnsibGF0IjotMTkuMTkzOTQ1OTQ1NTk3MDI2LCJsbmciOjE0OC4yMzcyNzU5NDk3MTEyfSwiYmVhcmluZyI6MCwicGl0Y2giOjAsInpvb20iOjUuNDQyODU0MDY4NjEzMzgsImRhdGFzZXRzIjpbeyJkYXRhc2V0IjoiMGIwMjA4YjYtYjQyNC00YjU3LTk4NGYtY2FkZGZhMjViYTIyIiwibGF5ZXJzIjpbImNjMzU0MzJkLTM4ZDctNGEwMy04NzJlLTNhNzFhMmY1NTVmYyIsIml0NTM1MGUzLTVhNzYtNDRjZC1iMGE5LTUwMzhhMGQ4YmZhZSJdLCJvcGFjaXR5Ijox LCJ2aXNpYmlsaXR5Ijp0cnVlfSx7ImRhdGFzZXQiOiJiNTg0OTU0Yy0wZDhkLTQwYzYtODU5Yy1mM2ZkZjNjMmM1ZGYiLCJsYXllcnMiOlsiNDlhODBlNzAtZWM1Mi00ZWY4LWJjYzYtZmIyNzcxZDk1YjJjIl0sIm9wYWNpdHkiOjEsInZpc2liaWxpdHkiOnRydWV9LHsiZGF0YXNld CI6ImM5Mml2NDExLWYwZTUtNDYwNi1iYmQ5LTEzOGU0MGU1MGViOCIsImxheWVycyI6WyIwY2JhM2M0Zi0yZDNiLTRmYjEtOGM5My1jOTUxZGMxZGE4NGIiXSwib3BhY2l0eSI6MSwidmlzaWJpbGl0eSI6dHJ1ZSwicGFyYW1zIjp7InRocmVzaCI6Ijc1In19XSwiZHJhd2luZyI6Zm Fsc2UsImNhbkJvdW5kIjpmYWxzZSwiYmJveCI6W119&menu=eyJtZW51U2VjdGlvbiI6IiJ9&treeLoss=eyJpbnRlcmFjdGlvbiI6e319
Official rainforest data for the state of Queensland in the year 2018 is 19 810 km². Subtropical rainforest in the southern parts of the state.
https://www.agriculture.gov.au/sites/default/files/abares/forestsaustralia/documents/sofr_2018/web%20accessible%20pdfs/SOFR_2018_web.pdf (page 52)
GFW primary forest cover 30 % + 2018 indicates only 127 km². This cannot be correct, as the World Heritage Site «Wet tropics of Queensland» has an area of 8 944 km² of mostly tropical rainforest, and Daintree National Park has protected a continuous rainforest of 1 200 km² since 1988. In addition, this does not fit well with the fact that GFW estimate an intact rainforest area of 4 152 km² within Australia's tropical belt.
http://www.environment.gov.au/heritage/places/world/wet-tropics
https://www.tropicalnorthqueensland.org.au/articles/10-facts-about-wet-tropics-rainforest/
https://www.abc.net.au/news/2018-12-26/wet-tropics-world-heritage-listing-30-years-on/10634460
https://parks.des.qld.gov.au/parks/daintree/pdf/daintree-discovery-guide.pdf
https://www.discoverthedaintree.com/daintree-rainforest-6/
https://www.environment.gov.au/system/files/pages/1716eb1c-939c-49a0-9c0e-8f412f04e410/files/ecoregions_1.pdf
https://www.worldwildlife.org/ecoregions/aa0117
http://www.agriculture.gov.au/abares/forestsaustralia/profiles/australias-forests
https://www.agriculture.gov.au/sites/default/files/abares/forestsaustralia/documents/sofr2013-web2.pdf

125) GFW primary forest cover 30 % + canopy.
http://www.fao.org/3/a-az212e.pdf (page 13)
https://www.worldwildlife.org/ecoregions/oc0105
http://www.fao.org/docrep/006/AD672E/ad672e08.htm

126) GFW primary forest cover for the year 2000 estimates 0 km². This does not seem to be correct.
IUCN estimate in the report Climate Change and Biodiversity in the European Union Overseas Entities that trpocal rainforest cover 21 % of New Caledonia's land mass in 2008. This equals 3 900 km². We have added the mangrove forest area from 2009 Country Report to FAO 2015.
https://portals.iucn.org/library/sites/library/files/documents/2010-064.pdf
http://www.fao.org/3/a-az289f.pdf (Page 8) «Forêt dense sur substrat volcano-sédimentaire» and mangroves covered 6 826 km² in 2009.
https://www.researchgate.net/publication/280975121_New_Caledonia_A_Pleistocene_refugium_for_rain_forest_lineages_of_relict_angiosperms
https://www.worldwildlife.org/ecoregions/aa0113
https://www.botany.one/2018/02/makes-new-caledonian-rainforests-different/
https://newcaledoniaplants.com/plant-catalog/humid-forest-plants/
https://www.researchgate.net/publication/280975121_New_Caledonia_A_Pleistocene_refugium_for_rain_forest_lineages_of_relict_angiosperms

127) GFW primary forest cover 30 % + canopy cover.
http://www.fao.org/3/a-az371e.pdf (page 7-10) "mid-height forest", "low forest", "swamp forest", "mangrove forest" cover a combined area of 4 445 km² in 1992.
https://www.worldwildlife.org/ecoregions/aa0126

128) GFW primary forest cover 30 % + canopy cover.
http://micronesica.org/sites/default/files/2_kitalong.pdf
http://palauecosystem.weebly.com/tropical-rainforest.html
http://www.fao.org/3/a-az301e.pdf

129) GFW primary forest cover does not exist on Samoa. This is proably due to the fact that almost all is secondary young forest, heavily degraded and open secondary forest.
http://www.fao.org/3/a-am246e.pdf page 10, «medium forest» (between 40 og 65 % canopy cover) was estimated to cover 726 km² in 2004. Closed forest (over 65 % canopy cover) covered only 0,8 km².
http://www.fao.org/3/a-az325e.pdf
https://www.worldwildlife.org/ecoregions/oc0112

130) We have used GFW to find «Intact Forest Landscapes» in rainforest regions with canopy cover at 75 % +.

131) The IFL area of Himachal Pradesh has been subtracted from the total, as there is no primary humid tropical forest there.

132) We have included the municipalities of the region Santa Cruz that best correspond to the Chiquitano and Chaco forests, which are Chitquitos, Cordillera, and José Miguel de Velasco. This is approximate. In the municipalities that are covered with Chiquitano and Chaco forests the deforestation was at almost 9 000 km² in the period.

133) In the municipalities that are covered with Chiquitano and Chaco forests the deforestation was 1212 km² in the period.

134) https://www.worldwildlife.org/biomes/tropical-and-subtropical-moist-broadleaf-forests
https://esajournals.onlinelibrary.wiley.com/doi/full/10.1890/ES12-00299.1
135) http://www.fao.org/3/ad652e/ad652e07.htm#P470_31994
http://foris.fao.org/static/data/fra2010/ecozones2010.jpg
136) https://www.worldwildlife.org/ecoregions/nt0104
137) https://www.sciencedirect.com/topics/earth-and-planetary-sciences/cloud-forest
https://books.google.no/books?id=4hi5BwAAQBAJ&printsec=frontcover&hl=no#v=onepage&q&f=false
https://biblio.flacsoandes.edu.ec/libros/digital/55826.pdf
https://www.canopyintheclouds.com/learn/
138) https://www.globalforestwatch.org/
139) https://iopscience.iop.org/article/10.1088/1748-9326/aacd1c#erlaacd1cs2
https://iopscience.iop.org/1748-9326/13/7/074028/media/ERL_13_074028_SD.pdf
https://glad.umd.edu/dataset/gfm/humid/humid-tropical-forest
https://wri-indonesia.org/en/blog/global-forest-watch-technical-blog-definition-and-methodology-2019-forest-loss-data-indonesia
140) https://www.globalforestwatch.org/
141) http://foris.fao.org/static/data/fra2010/ecozones2010.jpg
142) https://www.worldwildlife.org/biome-categories/terrestrial-ecoregions
143) https://www.worldwildlife.org/ecoregions/nt0212
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4874403/
144) https://www.worldwildlife.org/ecoregions/nt0181
https://web.archive.org/web/20100308074846/http://www.nationalgeographic.com/wildworld/profiles/terrestrial/nt/nt0181.html
145) http://foris.fao.org/static/data/fra2010/ecozones2010.jpg
http://www.fao.org/3/ad652e/ad652e07.htm#TopOfPage
146) https://www.worldwildlife.org/ecoregions/at0719
147) https://www.worldwildlife.org/ecoregions/nt0704
148) https://www.worldwildlife.org/ecoregions/nt0210
149) https://www.worldwildlife.org/ecoregions/at0203
150) https://www.worldwildlife.org/ecoregions/im0111
https://www.worldwildlife.org/ecoregions/im0150
151) https://www.researchgate.net/publication/271326041_Tropical_gallery_forests
https://besjournals.onlinelibrary.wiley.com/doi/pdf/10.1046/j.1365-2664.1998.00300.x
152) https://iopscience.iop.org/article/10.1088/1748-9326/aacd1c
153) http://www.intactforests.org/index.html
154) http://www.fao.org/3/ad652e/ad652e24.htm#P5754_508922
155) http://www.fao.org/3/ad652e/ad652e00.htm#TopOfPage

Rainforest Foundation Norway supports indigenous peoples and traditional populations of the world's rainforests in their efforts to protect their environment and secure their customary rights. RFN was established in 1989 and works with local environmental, indigenous and human rights organisations in the main rainforest countries in the Amazon region, Central Africa, Southeast Asia, and Oceania. RFN is an independent organisation, and part of the international Rainforest Foundation network, with sister organisations in the United Kingdom and the USA.

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