Food and Agriculture Organization of the United Nations

African Union

AFRICA OPEN D.E.A.L

OPEN DATA FOR ENVIRONMENT, AGRICULTURE AND LAND & AFRICA'S GREAT GREEN WALL

TOWARDS A CONTINENTAL LEADERSHIP ON ENVIRONMENTAL DATA

JULY 2021

Using new geo-spatial technologies for a pan-African open data collection and analysis to support biophysical assessments of the continent, countries and local conditions.

THE CONTEXT

Between 2018 and 2020, the Food and Agriculture Organization (FAO) of the Untied Nations and the **African Union** (AU) with the support of the Panafrican Agency of the Great Green Wall (PA-GGW), regional and national institutions of 30 countries[1], coordinated a continental-scale data collection on **many parameters related to biophysical environment, agriculture and land use.**

Africa Open DEAL makes Africa the first continent to complete the collection of accurate, comprehensive, and harmonized **digital land use and land use change data.** These data are simultaneously important for the three Rio Conventions (the UN Convention to Combat Desertification - UNCCD, the UN Framework for Climate Change - UNFCC, the Convention on Biological Diversity - CBD), as well as for monitoring and reporting against the UN Sustainable Development Goals (SDG) indicators.

Africa Open DEAL builds on the regional experience of the Great Green Wall - Sahel where national Institutions and FAO created unique knowledge, biophysical baseline data and fact-based information through the Action Against Desertification programme. In support of the implementation of FAO's Climate Change Strategy which sees FAO supporting its Member Nations in achieving their commitments under the **Paris Agreement** and their priorities under the SDGs and other international and regional pledges, FAO and **Google** are working together to develop and promote advanced geospatial technology accessible to everyone and user-friendly tools (e.g., Collect Earth and EarthMap.org). Together the aim is to better manage the world's natural resources and contribute to a sustainable development, in particular in developing countries.
This **new digital geospatial technology** empowers data users and provides free access to earth observation and climate data together with free and extraordinary computational capacity.

THE GOALS

The aim of the Africa Open DEAL initiative is to help and support all of the African countries and the **African Union Commission** in collecting and reporting on environmental, agricultural land use and climate data that:

- Increases countries' abilities in land monitoring, tracking associated changes and environmental related analyses.
- Supports and improves **international and national reporting** from African countries, on:
  - the Agriculture, Forestry and Other Land Use (AFOLU) sector under UNFCCC;
  - the Land Degradation Neutrality indicators under UNCCD;
  - the landscape biodiversity indicators under CBD;
  - the Sustainable Development Goals indicators on Climate Action (SDG 13) and Life on Land (SDG 15);
  - the agriculture statistics under FAOSTAT;
  - the Ramsar Convention on wetlands.
- Strengthens countries' capacities to monitor and plan their preparedness for climate related hazards and disasters using new geo-spatial technologies and new open data policies.

[1] Algeria, Burkina Faso, Botswana, Burundi, Cape Verde, Comoros, Democratic Republic of the Congo, Djibouti, Eritrea, Ethiopia, Ghana, Kenya, Lesotho, Madagascar, Malawi, Mali, Mauritania, Morocco, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, Sudan, South Africa, Tunisia, Zambia and Zimbabwe.

AFRICA OPEN DEAL & AFRICA'S GREAT GREEN WALL IN NUMBERS

Digital data collection through large scale capacity development

17 COLLECT EARTH TRAINING AND MAPATHON

workshops conducted in Africa 2018–2020: Botswana, Burkina Faso, Burundi, Cape Verde, Democratic Republic of the Congo, Ethiopia, Ghana, Kenya, Madagascar, Morocco, Niger, Rwanda, Senegal, South Africa, Tunisia, Zambia and in FAO Headquarters in Rome.

350+ OPERATORS

national, regional experts and reviewers worked collaboratively in synergy for this ambitious initiative.

318 000 SYSTEMATIC SAMPLING UNITS ASSESSED

(0.5 hectare sample plots) for which biophysical, land use, land management and disturbances information was collected, including

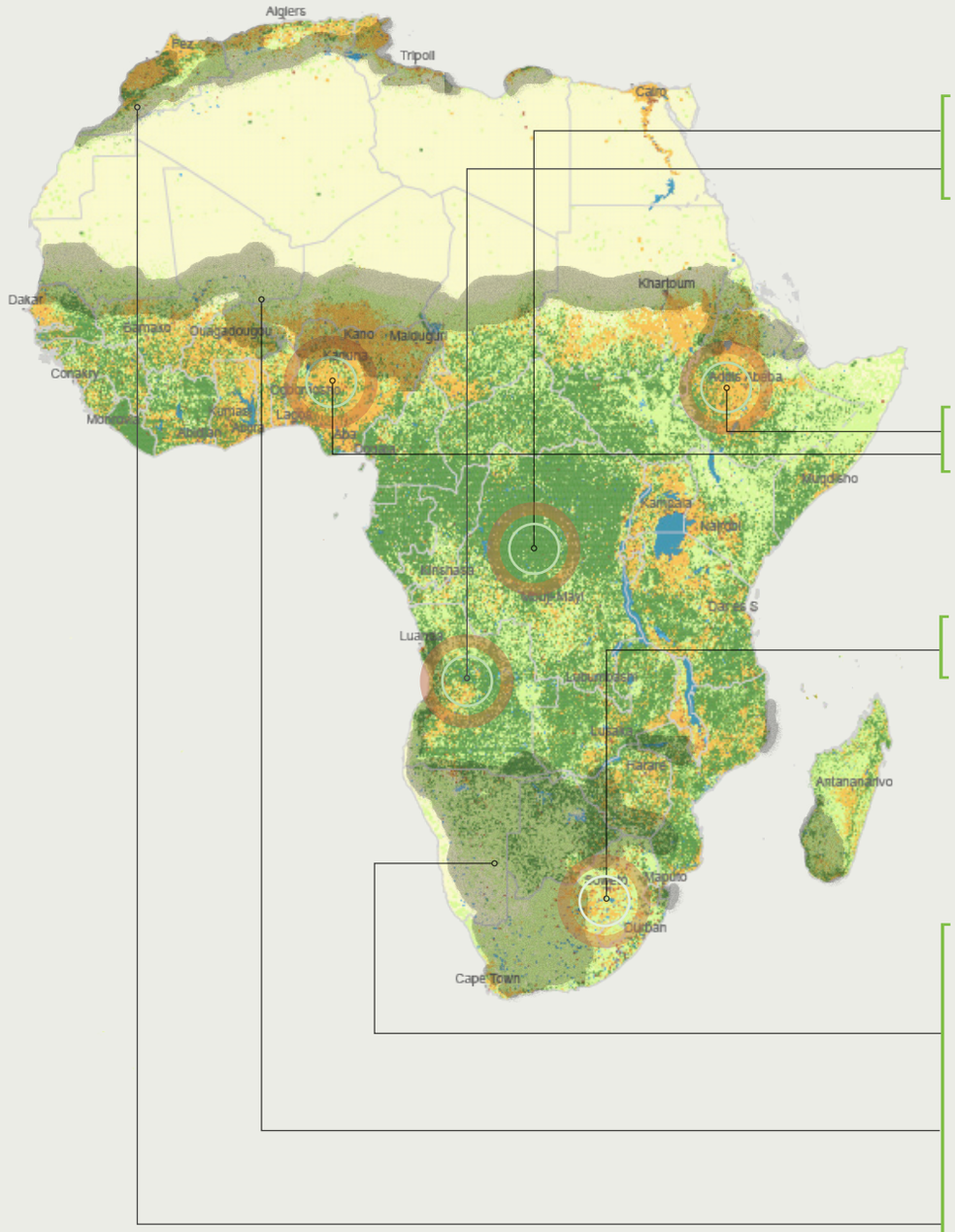
88 000

plots (28 percent) for Africa's Great Green Wall.

120

environmental variables and land **PARAMETERS COLLECTED**

on each sample plot.



DATA ANALYSES AND THE FINDINGS

26 percent of land In Africa classified as forest
more than **100 million ha** of what previously reported by countries.

With **155 million ha** Democratic Republic of the Congo has the largest forest area followed by Angola with **66 million ha**

350 million ha of cropland are cultivated in Africa, more than two times the area cultivated in the European Union.
10 percent of cropland are irrigated.
17 million ha of new cropland since 2000, a **5 percent** increase.

With **50 million ha** Nigeria is the country with more cropland followed by Ethiopia with **29 million ha**

27 percent of Africa is covered by grassland (shrublands and savannahs) with a total of **817 million ha**

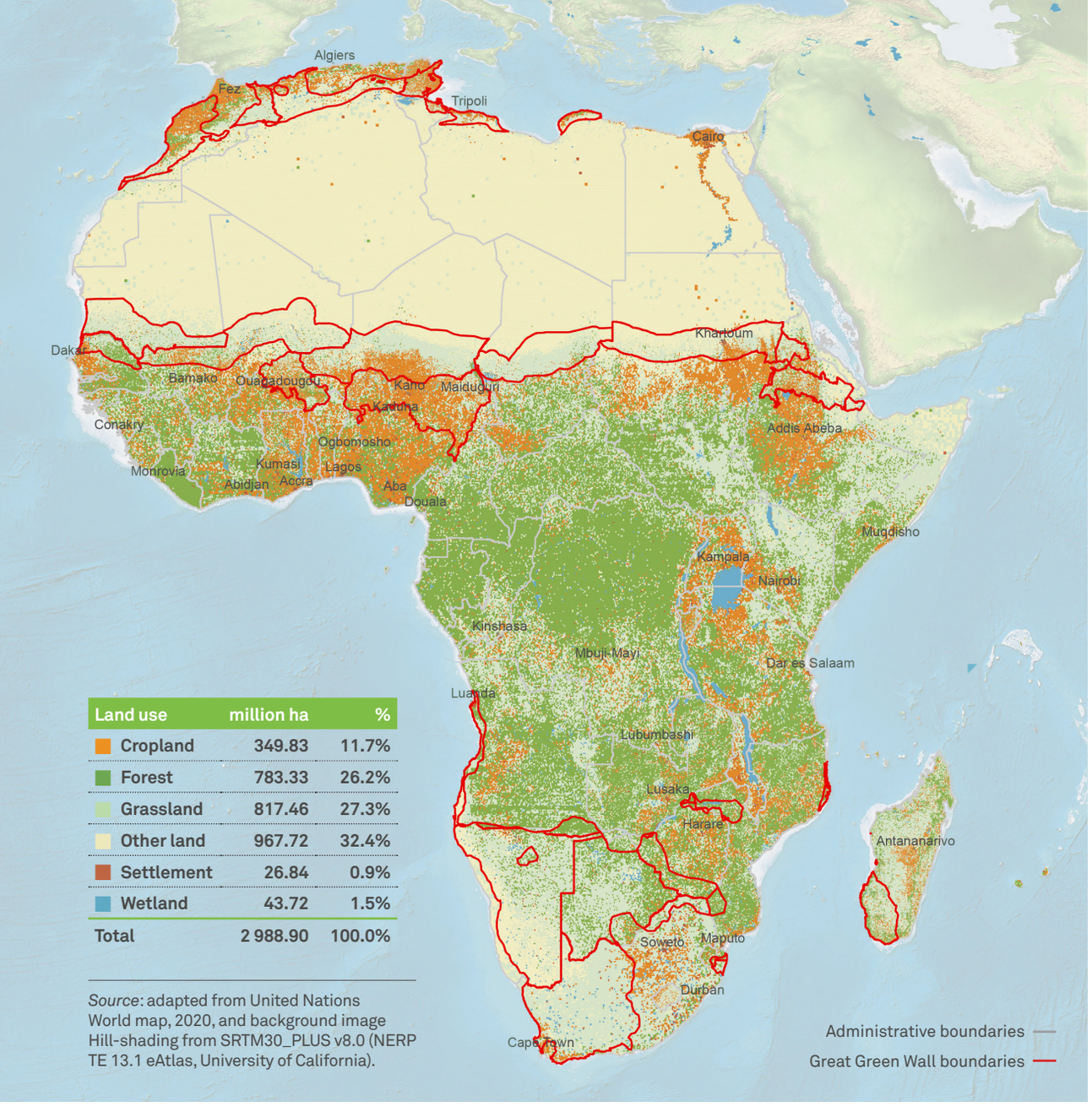
With **122 million ha** South Africa is the land of grasslands, which cover **73 percent** of the whole national territory.

Africa is home of **6.9 billion trees** outside forest, distributed over **537 million ha** that are additional to forests. With **809 million trees** South Africa is the country with more trees outside forest followed by Ethiopia and Nigeria with respectively **407** and **402 million trees**.

Africa's Great Green Wall is the essential core area of the **1 billion ha** of the continent drylands, including **780 million ha** in the Sahara-Sahel region and **228 million ha** in Southern Africa; with 50 percent of which, ca. **520 million ha** defined as area of interest composed of **50 million ha** in North Africa, **241 million ha** in the Sahel region and **228 million ha** in Southern Africa.

393 million ha is the restoration potential and opportunities in the continental Great Green Wall areas (Bastin *et al.*, 2019), including **33 million ha** restorable in Northern Africa, **162 million ha** in the Sahara-Sahel countries and **198 million ha** in the Kalahari-Namib countries.

Source: adapted from United Nations World map, 2020.



Land use	million ha	%
Cropland	349.83	11.7%
Forest	783.33	26.2%
Grassland	817.46	27.3%
Other land	967.72	32.4%
Settlement	26.84	0.9%
Wetland	43.72	1.5%
Total	2 988.90	100.0%

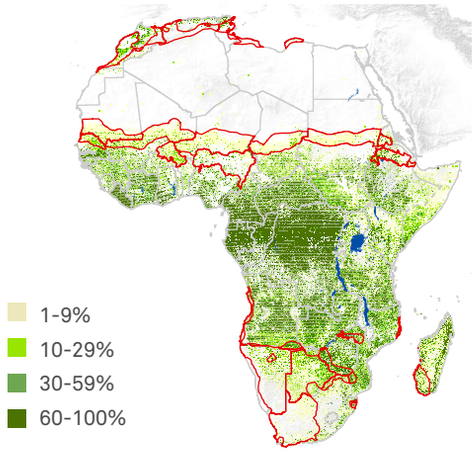
Source: adapted from United Nations World map, 2020, and background image Hill-shading from SRTM30_PLUS v8.0 (NERP TE 13.1 eAtlas, University of California).

LAND USE IN AFRICA

The main land use types in Africa, following the Intergovernmental Panel on Climate Change (IPCC, 2019) land representation classification, show the central region of the continent covered by extensive tropical forests (dark green) which merge to the north and south with grassland/shrubland (light green) prevalent areas. A concentration of cropland (orange) is detected in various areas mixed with grassland and forests, indicating the human alterations of natural vegetation patterns. With increasing aridity, vegetation presence decreases toward drylands and desert-like conditions (light yellow).

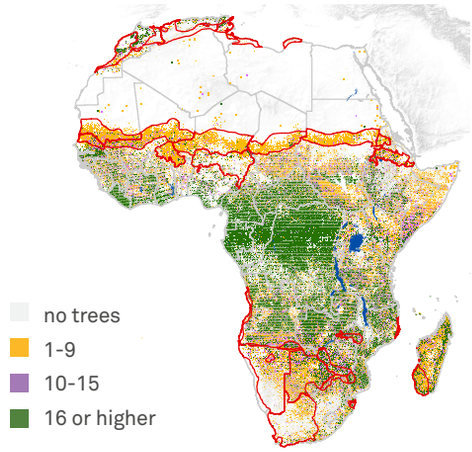
TREE COVER IN GRASSLAND/FOREST

This map shows the tree cover distribution in grassland, forest or wetland land uses. Highest values are in tropical areas, with reduction toward more arid environments.

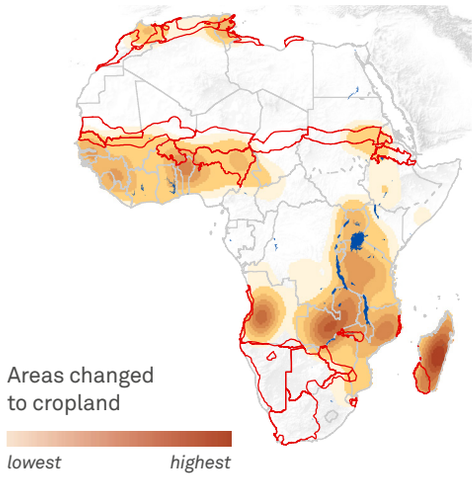


TREE COUNT

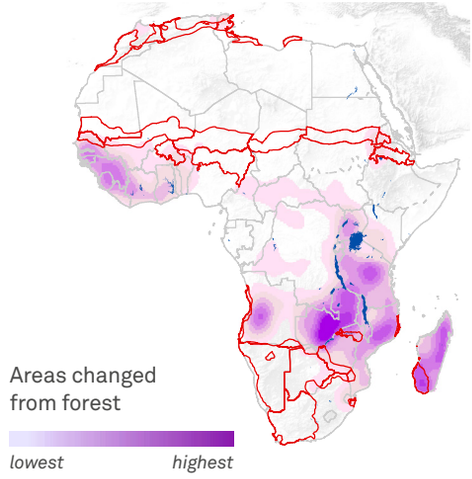
This map shows the detected number of trees (any type excluding palm trees) per plot (0.5 ha) analyzed.



LAND USE CHANGE 2000–2019



Areas changed from any land use to cropland representing 26.1 million ha of land. Zambia, United Republic of Tanzania, Mozambique and Madagascar in Southeast Africa, Angola in Southwest, and Nigeria and Guinea in West Africa are the most affected.



Areas changed from forest to any land use representing 22 million ha of land. Zambia, United Republic of Tanzania, Mozambique and Madagascar in Southeast Africa, Angola in Southwest, Democratic Republic of the Congo in Central and Guinea and Côte d'Ivoire in Western Africa are the most affected.

Source: adapted from United Nations World map, 2020.

METHODOLOGY

MAPATHONS – OR GROUP DATA COLLECTIONS

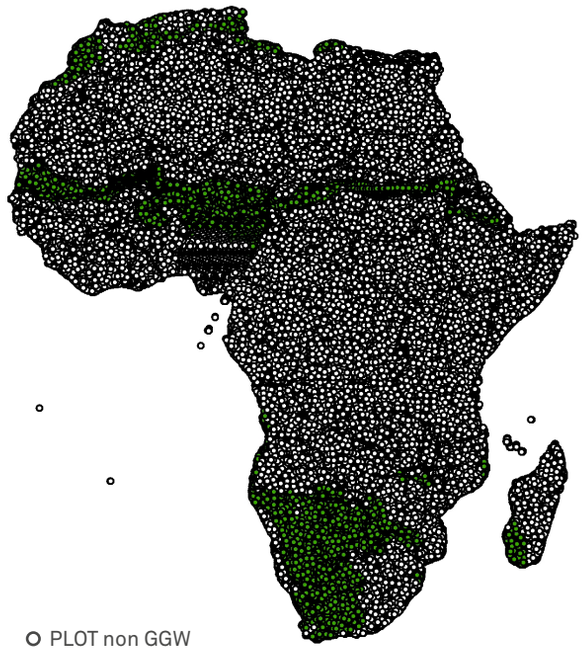
More than **350 African experts** with knowledge of landscapes, GIS and laand uses conducted the data collection using the free open-source software tool **Collect Earth**. The interpretation was made throughout 2019–2020 in 16 nationally and regionally focused workshops (Collect Earth trainings and group data collection, called Mapathons) convened by FAO in collaboration with government and regional institutions including the Panafrican Agency of the Great Green Wall (PA-GGW) and the Southern Africa Development Community (SADC).

TOOLS USED

Collect Earth is a software in the Open Foris suite developed by FAO in cooperation with Google Earth Outreach, for land monitoring. It enables data collection through Google Earth. In conjunction with Google Earth, Bing Maps and Google Earth Engine, users can analyse very high-resolution satellite imagery for a wide variety of purposes, including assessments of the Agriculture, Forestry and other land use sectors (AFOLU).

SAMPLING DESIGN

The assessments draw on information from more than **300 000 sampling plots** in Africa. The plots were distributed over stratified systematic grids for which the continent has been divided in (i) the hyper-arid zones, which were sampled at a lower intensity (20x20km) because of the relative homogeneity of the landscape, and (ii) the non-hyper arid areas with a sampling intensity of 10x10 km. In addition, the **Great Green Wall area** has had a sampling design with a denser grid (6.5x6.5 km). At the national level, some of the countries opted for higher sampling density (e.g. Tunisia 4x4 km or Eswatini 2x2 km) in order to improve the accuracy of collected data.



Source: FAO based on Africa Open Deal database, 2021.

COLLECTED DATA

Around **120 different environmental variables and land parameters** were collected, including numbers and density of trees, existence of infrastructures, wild fires etc.

ASSESSMENT OF DATA ACCURACY

3 200 plots (or 1 percent of the total sampling plots) were randomly selected throughout the continent, and were re-interpreted by FAO experts to quantify the measurement error. The overall accuracy, also including the sampling error, is estimated at over 90 percent over the whole sample with specific parameters, with uncertainties below 3 percent.

MAIN RESULTS

LAND USE IN AFRICA IN 2019

The six main land use types in Africa are defined according to the Intergovernmental Panel on Climate Change (IPCC[2], 2019), and include Cropland, Forest, Grassland, Other land, Wetland and Settlement. **Other land** is the most represented land use, covering mainly desert, barren and unproductive areas, while **Grassland** and **Forest** cover represent more than 50 percent of the whole continent, and **Cropland** nearly 20 percent.

[2] **Six broad categories of land which may be considered as top-level categories for representing land areas within a country (IPCC, 2003).**

LAND USE CHANGE IN AFRICA BETWEEN 2000 AND 2019

Between 2000 and 2019, land use change involved mostly a reduction of forest (-2 percent), grassland, other land and wetland (-1 percent in favour of settlement (18 percent) and cropland (5 percent).

Land use categories	Million ha (Mha)	%
Cropland (arable and tillage land, and agro-forestry systems not forest)	349.83	11.70%
Forest (land with woody vegetation consistent with thresholds for GHG inventory)	783.33	26.21%
Grassland (rangelands and pasture not cropland)	817.46	27.35%
Other land (bare soils, rock, sand dunes, and all unmanaged land)	967.72	32.38%
Settlement (transportation infrastructure, villages and human settlements)	26.84	0.90%
Wetland (land covered or saturated by water for all or part of a year)	43.72	1.46%
TOTAL	2 988.90	100%

Land Use	year 2000 (Mha)	year 2019 (Mha)	Change 2019–2000 (Mha)	Change 2019–2000 (%)
Cropland	330.82	347.78	17.0	5.1%
Forest[3]	797.96	782.98	-15.0	-1.9%
Grassland	821.47	816.21	-5.3	-0.6%
Other land	967.82	967.60	-0.2	-0.02%
Settlement	22.36	26.48	4.1	18.4%
Wetland	44.31	43.67	-0.6	-1.4%

[3] **2019 data: in Global forest resources assessment (FRA) 2020, forest is estimated approximately 640 million ha (lower than the current figure) and forest loss between 2000 and 2019 is estimated approximately 70 million ha (higher than the current figure). Please note that these data are different because of different methodologies adopted, i.e. sample-based approach using high-resolution satellite imagery versus national reports submissions.**

LAND DEGRADATION ASSESSMENT DUE TO LAND USE TRANSITION

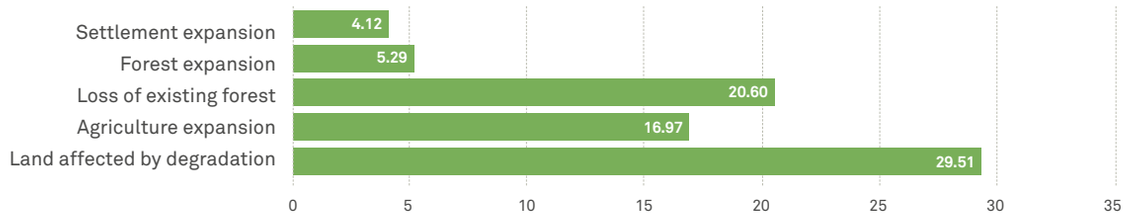
Applying the land use transition matrix developed by UNCCD to monitor land degradation and assess the progress towards the target of the SDG 15.3 (Land Degradation Neutrality by 2030), nearly **30 million ha** of land in Africa were assessed as degraded (in red) because of land use change, in particular due to deforestation.

Land Use Matrix 2000–2019	Cropland	Forest	Grassland	Otherland	Settlement	Wetland	Land Use 2000
	Mha	Mha	Mha	Mha	Mha	Mha	Mha
Cropland	323.83	1.77	3.46	0.15	1.55	0.05	**330.8**
Forest	12.09	777.36	7.30	0.31	0.86	0.04	**798.0**
Grassland	11.08	3.33	804.51	0.83	1.60	0.12	**821.5**
Other land	0.61	0.18	0.64	966.09	0.24	0.05	**967.8**
Settlement	0.07	0.02	0.06	0.01	22.20	0.00	**22.4**
Wetland	0.10	0.33	0.24	0.21	0.03	43.41	**44.3**
Land Use 2019 (Mha)	**347.8**	**783.0**	**816.2**	**967.6**	**26.5**	**43.7**	**2 984.7**

→ Summary of land degradation assessment due to land use transition between 2000 and 2019

Status of Sustainable Development Goal 15.3	Mha	%
DEGRADATION	29.51	0.99%
IMPROVEMENT	17.82	0.60%
STABLE	2 937.39	98.41%

→ Summary of land use changes 2000–2019

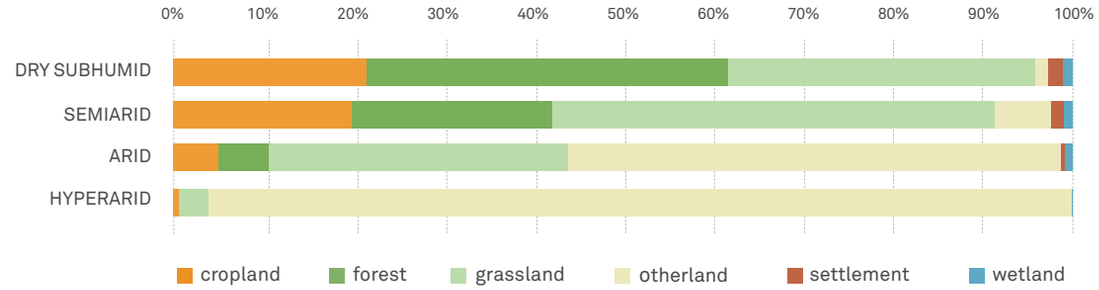


The summary table illustrates a selection of land use changes and their impact (million ha):

- Settlement expansion (2019 minus 2000 settlement area).
- Forest expansion (any non-forest of 2000 becoming forest in 2019).
- Loss of existing forest (any forest of 2000 lost to other uses).
- Agriculture expansion (2019 minus 2000 cropland area).
- Land affected by degradation (based on SDG 15.3.1 land cover sub-indicator assessment).

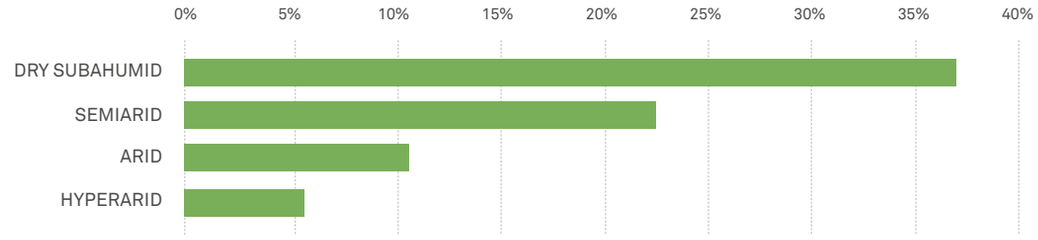
→ Land use distribution (proportion of total area) by aridity (2019)

Approximately 66 of Africa's land is classified as dryland (**1 billion ha**). The table shows the distribution of land uses as proportion of total land, by dryland class. The proportion of forest gets lower from dry sub-humid to hyperarid while the proportion of other land increases. Grassland is equally represented in all categories of dryland except hyperarid.



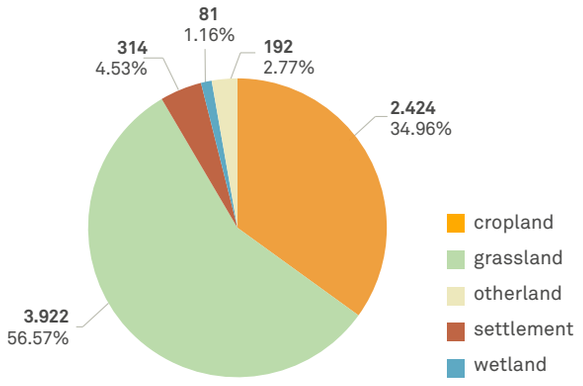
→ Average tree cover density in Africa's drylands

The African dryland in which tree cover detected is approximately 500 million ha (17 percent of total land). The average cover density in dryland with trees is 25 percent, spanning from 6 percent in the hyperarid to 37 percent in the dry sub-humid:



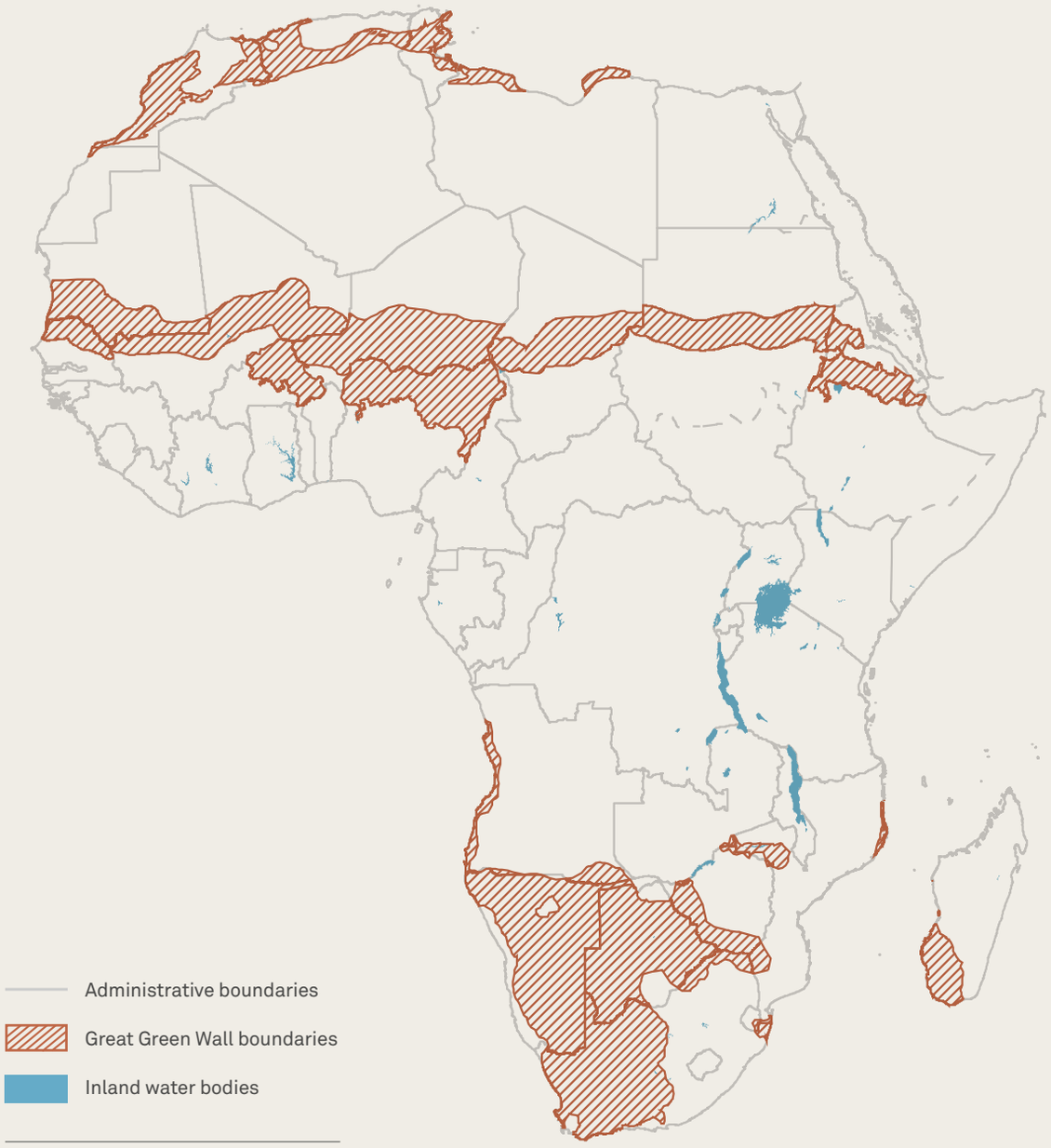
→ Trees Outside Forest by Land Use category

Data on number of trees, especially outside of forests, are important sources of environmental and economic information and benefits in Africa's dryland regions. The tree count in Africa tallies almost **43 billion trees**, of which 16 percent (nearly 7 billion trees) are located outside forest. Of those trees, 57 percent are found in grassland, 35 percent in cropland and nearly 5 percent in settlement.



AFRICA'S GREAT GREEN WALL

The continental Great Green Wall area of interest is composed of three dryland regions, i.e. North Africa, Sahel and Southern Africa, encompassing 25 countries.



Administrative boundaries

Great Green Wall boundaries

Inland water bodies

Source: adapted from United Nations World ma, 2020 and inland water bodies from Natural Earth.

GREAT GREEN WALL AREA

REGION	National administrative area (Mha)	GGW core area (Mha)	GGW proportion area (%)
North Africa (5 countries)	501.57	50.33	10%
Sahel (11 countries)	935.44	241.30	26%
Southern Africa (9 countries)	642.42	227.84	35%
	2 079.4	**519.5**	25%

TREE COVER RESTORATION POTENTIAL (Bastin, *et al.* 2019)

REGION	Country-wide restorable land (Mha)	GGW restorable land (Mha)	GGW restorable proportion (%)
North Africa (5 countries)	97.18	33.26	34%
Sahel (11 countries)	446.25	161.73	36%
Southern Africa (9 countries)	449.30	198.48	44%
	992.7	**393.5**	40%

BIOMASS CARBON STOCK (Soto-Navarro, *et al.* 2020)

REGION	GGW Biomass Carbon stock 2010 (MtC)	GGW Biomass Carbon density (tC/ha)	GGW Biomass stock proportion (% national)
North Africa (5 countries)	377.4	10.9	46%
Sahel (11 countries)	1 166.3	6.3	15%
Southern Africa (9 countries)	2 305.1	10.2	16%
	3 848.8	**27.4**	

POTENTIAL CARBON GROSS GAIN

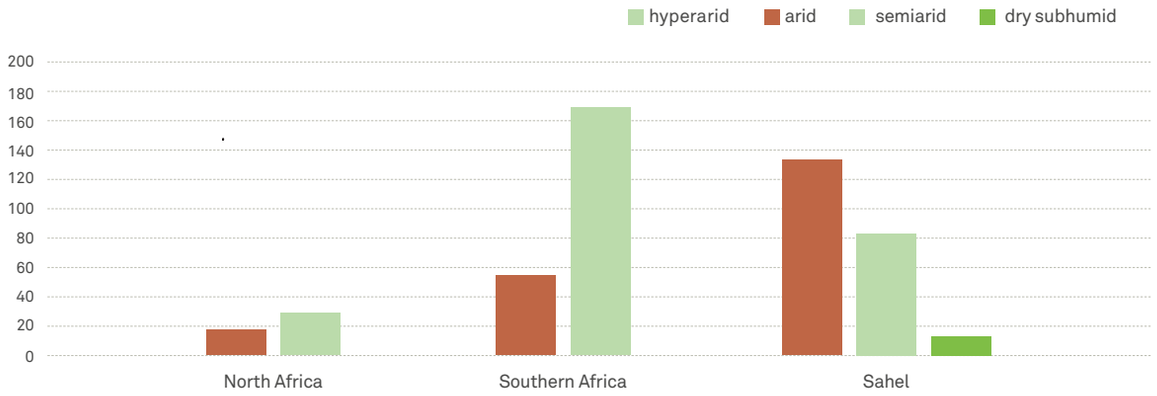
REGION	Total gross gain: low bound (MtC)	Total gross gain: high bound (MtC)	Soil Carbon Stock removal/loss (MtC)
North Africa (5 countries)	69	154	-41
Sahel (11 countries)	542	1 205	-324
Southern Africa (9 countries)	1 352	3 004	-545
	1 964	**4 363**	**-910**

SOIL CARBON STOCK (Hengl, *et al.* 2017)

REGION	GGW Soil 1m Carbon stock (MtC)	NATIONAL Soil 1m Carbon stock (MtC)	National soil C / GGW soil C
North Africa (5 countries)	2 307	5 077	2
Sahel (11 countries)	9 865	42 462	4
Southern Africa (9 countries)	9 592	48 484	5
	21 764	**96 024**	

> AFRICA'S GREAT GREEN WALL

The total area of interest of **Africa's Great Green Wall is approximately 520 million ha** (17 percent of the African continent, almost entirely its drylands). Three regions of the continental Great Green Wall have been defined by the African Union, including North Africa (10 percent), Southern Africa and the Sahel (45 percent each). The semiarid type drylands are prevalent in the Southern Africa region while the arid type is prevalent in the Sahel.



→ Land Use Distribution in the Great Green Wall area

Approximately 50 percent of the continental GGW area is grassland, with a lower proportion in North Africa (37 percent) and a higher proportion in Southern Africa (58 percent) with presence of trees and shrubs.

Land Use 2019	GGW total	GGW total	GGW North Africa		GGW Sahel		GGW Southern Africa	
	Mha	% of total	Mha	% of total	Mha	% of total	Mha	% of total
Forest	**65.77**	13%	4.07	8%	15.68	6%	46.08	20%
Cropland	**73.91**	14%	14.58	29%	52.16	22%	7.47	3%
Grassland	**260.27**	50%	18.53	37%	108.80	45%	133.22	58%
Settlement	**5.44**	1%	1.47	3%	2.17	1%	1.96	1%
Wetland	**7.27**	1%	0.72	1%	2.59	1%	3.97	2%
Other land	**106.45**	21%	11.08	22%	60.01	25%	35.37	16%
Total	**519.1**	**100%**	50.5		241.4		228.1	

→ Summary of Land Use Change in GGW area between 2000 and 2019

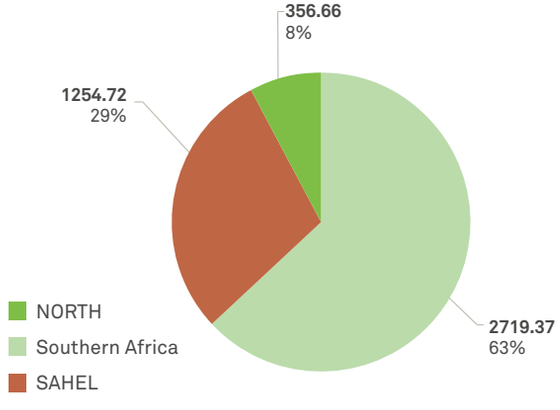
Nearly 5 million ha of lands have changed in land use between 2000 and 2019: loss of forest and grassland versus gain of cropland and settlement.

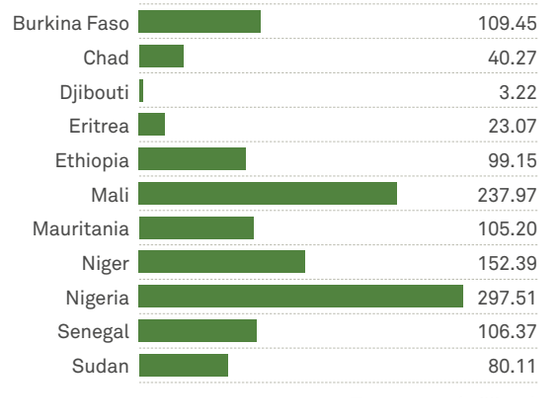
Land Use	year 2000	year 2019	Change 2019–2000	Change 2019–2000
	Mha	Mha	000 ha	%
Forest	**66.58**	**65.77**	-802.35	-1.21%
Cropland	**72.37**	**73.91**	1 534.68	2.12%
Grassland	**261.87**	**260.27**	-1 594.11	-0.61%
Settlement	**4.50**	**5.44**	939.10	20.88%
Wetland	**7.34**	**7.27**	-72.01	-0.98%
Other land	**106.45**	**106.45**	-5.31	0.00%
Total	**519.1**	**519.1**		

→ Trees in Africa's Great Green Wall area

Trees outside forest are of particular livelihood and socio-economic importance across agro-sylvo-pastoral production systems in Africa's Great Green Wall. Out of the 43 billion trees estimated in the whole continent, more than 4.3 billion trees were detected in the Great Green Wall area. In the Sahel region, Nigeria has the highest number of close to 0.3 billion trees.

Region	trees (millions)
North	356.66
Southern Africa	2 719.37
Sahel	1 254.72
Trees in GGW	**4 330.74**
Trees in Africa	**42 934.38**





GREAT GREEN WALL / SAHEL

Led by the African Union, the Great Green Wall initiative was endorsed in 2007, seeking to achieve a transformational change for millions of people by increasing resilience in the Sahara and the Sahel region[4] through an integrated landscape approach. The Panafrican Agency of the Great Green Wall (PA-GGW) was created on 17 June 2010 to monitor and coordinate the progress of the implementation of the Great Green Wall. The initiative is implemented at the country level by a national coordinating agency. The GGW – Sahel aims to grow an **8 000 km corridor of landscape restoration across the entire largest width of the Continent**. By 2030, the GGW – Sahel targets to restore 100 million hectares of currently degraded land, reduce emissions, sequester 250 million tons of carbon and create 10 million green jobs in rural areas. Its area of interest is defined by using both the countries and African Union's agreed harmonized regional strategy of specific buffered zones around the 100-400 mm (AUC/PA-GGW, 2012)[5] and of a minimum width of 100 km (ca. 1 degree) as the corridor North/South agreed by national experts. Exceptionally, Burkina Faso and Nigeria GGW areas of interest are identified with a set of subnational administrative units as indicated by their national GGW strategies and action plans.

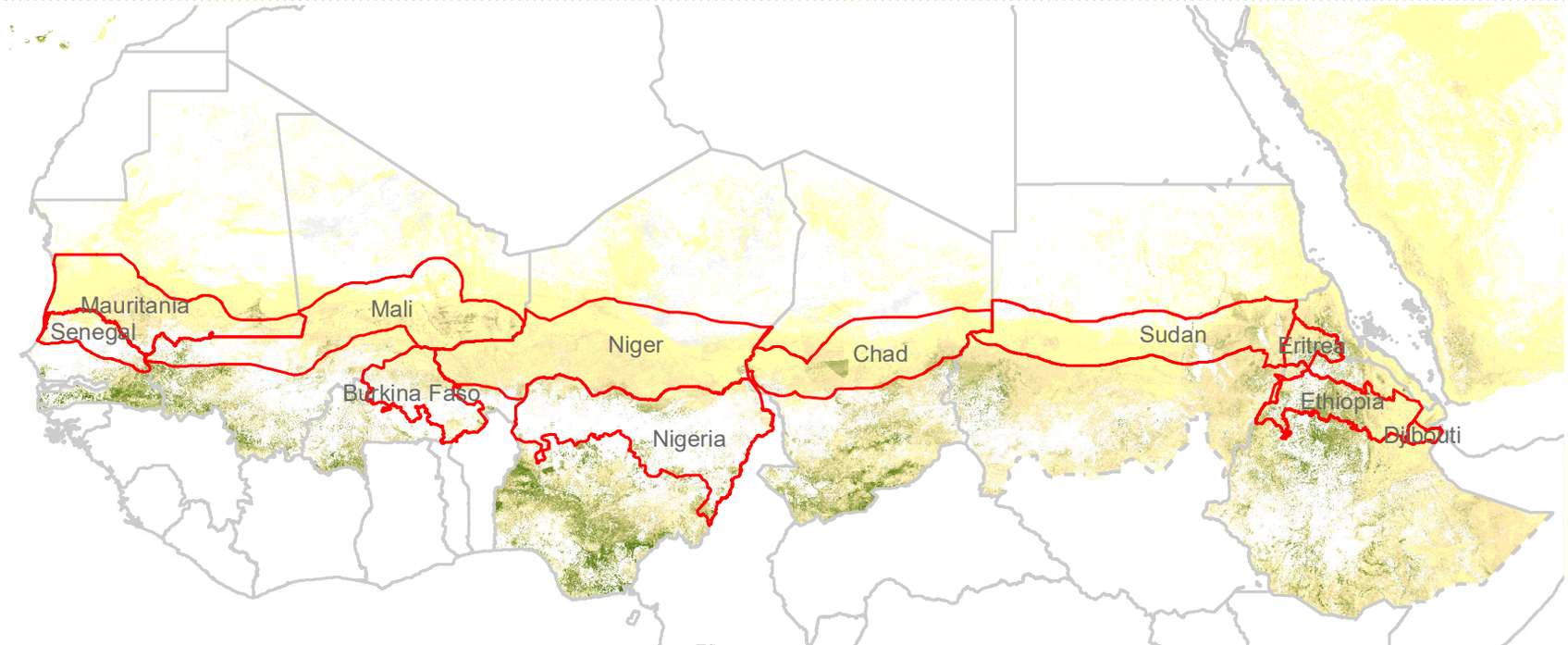
[4] On 17 June 2010 the following 11 Sahel countries signed a convention to establish a Pan-African Agency of the GGW in order to coordinate the implementation and monitoring of the GGW: Burkina Faso, Chad, Djibouti, Eritrea, Ethiopia, Mali, Mauritania, Niger, Nigeria, Senegal and Sudan.

[5] Harmonised regional strategy for implementation of the "GGW initiative for the Sahara and the Sahel" was achieved and adopted in 2012 based on strong political will to form an African partnership supported by international solidarity, in order to halt and reverse land degradation tendencies (water, soil, vegetation) in Africa's drylands through a coherent and cooperative set of actions. FAO was one of the principle supporters and authors.

→ Tree cover restoration potential of GGW

The restorable land in the GGW Sahel is estimated **162 million ha**, or equivalent 67 percent of the GGW area and 36 percent of the national restoration potential and opportunities. There are more than 1.2 billion trees within the Great Green Wall – Sahel area, scattered in **5 trees/ha** on average in this region. Senegal has the higher density of 15 trees/ha, while Chad has less than 2 trees/ha.

Country	Forest	Cropland	Grassland	Settlement	Wetland	Other land	TOTAL	Trees	Trees	Restoration potential
	Mha	Mha	Mha	Mha	Mha	Mha	Mha	millions	no/ha	Mha
Burkina Faso	2.11	5.40	5.03	0.11	0.05	0.02	**12.73**	**109.45**	**8.6**	**4.85**
Chad	0.70	0.54	15.63	0.12	0.31	9.20	**26.50**	**40.27**	**1.5**	**22.16**
Djibouti	0.02	0.00	0.68	0.01	0.03	0.34	**1.08**	**3.22**	**3.0**	**1.06**
Eritrea	0.31	0.65	2.53	0.01	0.05	0.29	**3.84**	**23.07**	**6.0**	**2.96**
Ethiopia	1.32	3.46	4.61	0.22	0.32	2.89	**12.82**	**99.15**	**7.7**	**9.57**
Mali	2.62	3.21	17.50	0.11	0.42	12.55	**36.42**	**237.97**	**6.5**	**24.68**
Mauritania	0.91	0.52	14.40	0.15	0.21	7.64	**23.83**	**105.2**	**4.4**	**19.1**
Niger	1.15	11.28	23.14	0.29	0.19	10.38	**46.44**	**152.39**	**3.3**	**41.23**
Nigeria	3.35	22.49	11.36	0.76	0.66	0.25	**38.88**	**297.51**	**7.7**	**8.52**
Senegal	2.62	1.04	2.95	0.11	0.23	0.08	**7.03**	**106.37**	**15.1**	**2.13**
Sudan	0.56	3.54	10.97	0.28	0.12	16.37	**31.83**	**80.11**	**2.5**	**25.47**
GGW	**15.7**	**52.2**	**108.8**	**2.2**	**2.6**	**60.0**	**241.4**	**1 254.7**	**5.2**	**162**



→ Tree cover restoration potential in the Sahel

Map overlaying boundaries and restoration potential of GGW.

Administrative boundaries

Great Green Wall boundaries

Restoration Potential (Bastin *et al.* 2019)

Restorable canopy cover %

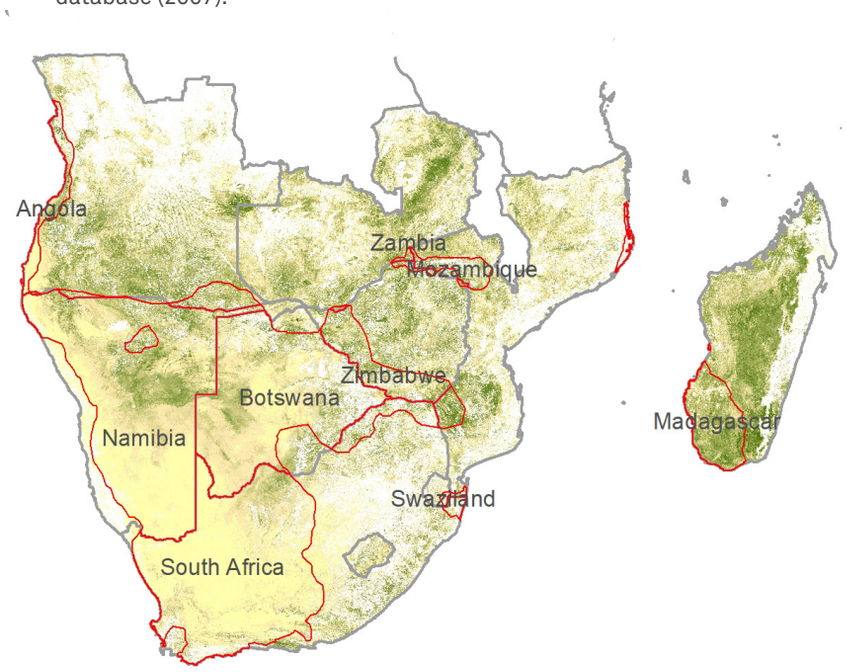
- No restoration
- 0.1 - 5
- 5.01 - 11.3
- 11.4 - 15.7
- 15.8 - 20.1
- 20.2 - 24.4
- 24.5 - 28.4
- 28.5 - 32.8
- 32.9 - 37.2
- 37.3 - 41.6
- 41.7 - 46.3
- 46.4 - 51.4
- 51.5 - 57.6
- 57.7 - 66
- 66.1 - 93

Source: adapted from United Nations World map, 2020.

GREAT GREEN WALL / SOUTHERN AFRICA

→ Tree cover restoration potential in Southern Africa

Great Green Wall - Southern Africa region is derived by using arid and semiarid zones from the United Nations Environment Programme - World Conservation Monitoring Centre (UNEP-WCMC) – Drylands database (2007).



Administrative boundaries

Great Green Wall boundaries

Restoration Potential
(Bastin *et al.* 2019)
Restorable canopy cover %

- No restoration
- 0.1 - 5
- 5.01 - 11.3
- 11.4 - 15.7
- 15.8 - 20.1
- 20.2 - 24.4
- 24.5 - 28.4
- 28.5 - 32.8
- 32.9 - 37.2
- 37.3 - 41.6
- 41.7 - 46.3
- 46.4 - 51.4
- 51.5 - 57.6
- 57.7 - 66
- 66.1 - 93

Sources: adapted from United Nations World map, 2020.

→ Tree cover restoration potential in Southern Africa's drylands

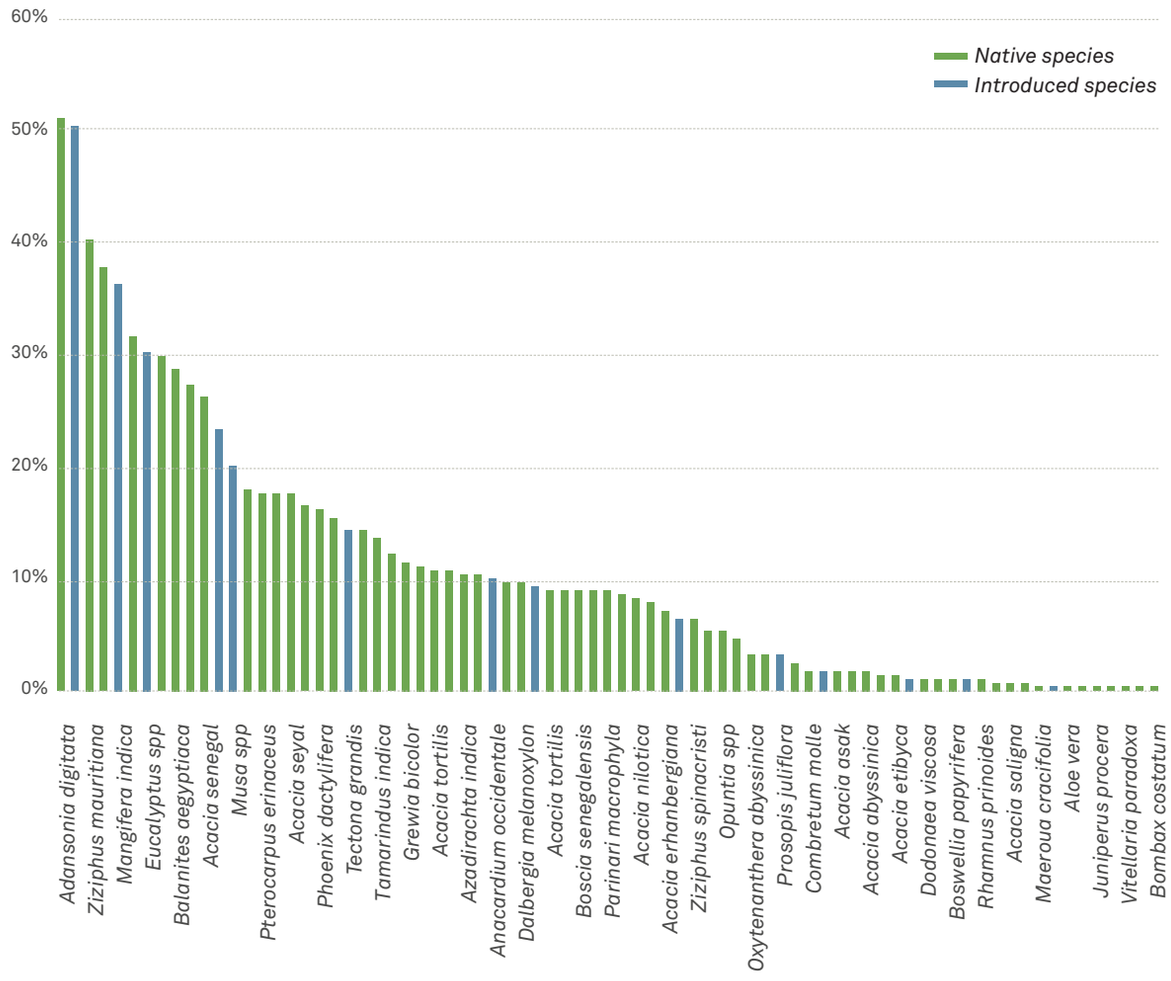
The restorable land in the GGW – Southern Africa is estimated 198 million ha, 87 percent of the GGW area and 44 percent of the restoration potential country-wide. On average, there are 12 trees/ha in this region.

Country	Forest	Cropland	Grassland	Settlement	Wetland	Other land	TOTAL	Trees	Trees	Restoration potential
	Mha	Mha	Mha	Mha	Mha	Mha	Mha	millions	no/ha	Mha
Angola	5.26	0.18	2.61	0.18	0.02	1.43	**9.67**	**209.02**	**21.6**	**7.80**
Botswana	18.28	0.56	28.92	0.36	0.90	1.80	**50.82**	**1 005.39**	**19.8**	**41.86**
Madagascar	2.99	1.27	6.63	0.03	0.11	0.17	**11.21**	**146.51**	**13.1**	**10.54**
Mozambique	4.54	0.51	1.85	0.06	0.32	0.05	**7.31**	**234.67**	**32.1**	**4.66**
Namibia	7.30	0.66	36.92	0.77	0.86	25.23	**71.75**	**399.50**	**5.6**	**67.22**
South Africa	1.34	2.97	52.47	0.52	1.67	6.20	**65.17**	**416.09**	**6.4**	**57.32**
Eswatini	0.13	0.08	0.05	0.01	0.00	0.00	**0.27**	**6.28**	**23.6**	**0.17**
Zambia	0.40	0.02	0.09	0.00	0.01	0.00	**0.52**	**19.86**	**38.3**	**0.41**
Zimbabwe	5.84	1.22	3.68	0.03	0.08	0.50	**11.35**	**282.04**	**24.8**	**8.50**
Total	**46.1**	**7.5**	**133.2**	**2.0**	**4.0**	**35.4**	**228.1**	**2 719.4**	**11.9**	**198**

BEYOND COUNTING TREES

WHY NEW TECHNOLOGIES MUST COMPLEMENT FIELD-WORK WITH COMMUNITIES AND COUNTRIES ON WHAT TO PLANT

Across all Action Against Desertification countries, over 200 species were mentioned as useful by communities following consultations and 110 of these species were planted to initiate degraded land restoration. Species with multiple uses and high market value were usually preferred, mostly utilized for food, feed or human and veterinary health (Sacande *et al.* 2020).



CONCLUDING REMARKS

By investing in experts' capacity development, Africa has taken advantage of digital technologies and has been a pioneer in producing a continental digital and comprehensive database on the biophysical environment, agriculture and land use.

Africa DEAL and Africa's Great Green Wall mapathons have proved that mobilising expertise is possible at national and regional levels and collective efforts ensures timely response, sustainability and data ownership for decision-making. Moreover, international partnership is successful when international services are no longer needed.

KEY MESSAGES

1. **Africa Open DEAL, is the first Africa wide digital statistical sampling-based assessment coordinated by African Experts** in close collaboration with the Pan-African Agency of the Great Green Wall, SADC, AUC, FAO and partner countries. It provides a baseline for monitoring changes and reporting on Africa's Agriculture, Forest, Land Use and other Land use (AFOLU).

2. **Africa Open DEAL** has put **Africa on track towards DIGITAL transformation.** Countries and regional institutions across Africa are benefiting from the advantage of using readily and cost-effective imagery assessments and analyses to support and track progress on their national, regional and international commitments in a quick and flexible manner and covering a large scope of surface areas and sectors.

3. **Africa Open DEAL is embedded in FAO's Hand-in-Hand Initiative** and provides a geo-spatial platform for reliable, independently verifiable data and fact-based information that are a foundation for guiding restoration efforts and climate action and tracking progress on implementation and biophysical impacts.

4. **Africa Open DEAL supports the implementation of African Union Agenda 2063 and Agenda 2030 for Sustainable Development.** It benefits Africa's Great Green Wall and African Forest Landscape Restoration Initiative (AFR100), both pledged to restore 100 million in Africa by 2030, and will support countries and regional institutions in tracking progress and reporting on commitments and international obligations.

5. **Africa contains more restorable lands than any other part of the Earth. There are 393 million hectares** of restoration opportunities for **Africa's Great Green Wall** alone. This accounts to more than the total 350 million of the Bonn Challenge and about one third of the 1 billion target of the UN Decade on Ecosystem Restoration (SER2021).

6. **Merging scientific and local knowledge.** Equally, high quality geo-spatial data must be complemented with local knowledge and perceptions on *what* is most ecologically, socially and economically suitable to plant if restoration effects are to be long-lasting. Beyond the numbers, monitoring of tree diversity is equally vital for successful restoration interventions.

7. **Countries are responsible and able to review and validate the collected data nationally and regionally** and use these data for reporting to their national, regional and international reporting systems. Credible, satellite imagery assessments do not replace, but complement field ground-proof assessments, inventories and assessments of richness in biodiversity.

UPCOMING OUTPUTS

- → **A full assessment report on Africa environment.** FAO and Africa Union Commission will continue to lead the preparation of a comprehensive report about the new knowledge on land use, environment, agriculture, water and climate change. The scope of this report is to identify policy relevant questions and scientific and technical topics to be addressed at continental level.

- → **Thematic reports at regional level.** FAO's Action Against Desertification will prepare reports on specific Africa's drylands including the continental Great Green Wall in the three regions of North Africa, the Sahel and the Kalahari-Namib of southern Africa, highlighting issues related to environmental and climate processes and defining restoration opportunities and carbon sequestration potentials.

- → **African Union and FAO will produce a joint Review report on the implementation of the Nationally Determined Contributions (NDC) in Africa,** highlighting progress, gaps, challenges and opportunities for NDCs implementation in African Union Member States' agriculture, forestry and land use sectors.

- → **National submissions under UNFCCC.** Countries will be supported in feeding the activity data (generated through the Collect Earth assessment) in national GHGs inventories for the AFOLU sector, related to the period 2000–2019, to improve their submissions such as the Biennial Update Report, Forest Reference Levels and National Communication.

- → **National submissions under UNCCD.** Each country will be able to use the data generated through Africa Open D.E.A.L to set its baseline for the Land Degradation Neutrality and review progress on its national LDN targets.

- → **National reports under CBD.** Data will be made available for each country to support its National Report related to four Aichi Biodiversity Targets (targets 5, 7, 11 and 15) and to set the baseline and measure progress in implementation of the post 2020 CBD Framework targets.

- → **National submissions to FAOSTAT.** Countries will receive data to support their submissions for a large set of country indicators related to agriculture production, emission, land use and forestry sections of the FAOSTAT database.

- → **Wetland and water resources data under the Ramsar Convention.** Countries will receive data to improve their National Reports on the Ramsar Convention goals and targets.

- → **Presentation on FAO's Hand-in-Hand geo-spatial Platform.** Countries will receive support to further populate their national data and information through this platform, which is hosted and maintained by FAO (with free training if required), though countries can freely agree or not to openly contribute and share their national data.

CONTACT

Moctar Sacande
FAO Headquarters

Danilo Mollicone
FAO Headquarters

Nora Berrahmouni
FAO Regional Office for Africa

Abakar Zougoulou
Panafrican Agency of the Great Green Wall

Harsen Nyambe Nyambe
African Union Commission

Sibongile Mavimbela
Southern African Development Community

REFERENCES

Bastin, J.F., Finegold, Y., Garcia, C., Mollicone, D., Rezende, M., Routh, D., Zohner, C.M., Crowther, T.W. 2019. The global tree restoration potential. SCIENCE. Vol. 365, Issue 6448, 76-79 pp. [cited 5 July 2019]. https://doi.org/10.1126/science.aax0848

Becker, J.J., Sandwell, D.T., Smith, W.H.F., Braud, J., Binder, B., Depner, J., Fabre, D., Factor, J., Ingalls, S., Kim, S.H., Ladner, R., Marks, K., Nelson, S., Pharaoh, A., Trimmer, R., Von Rosenberg, J., Wallace, G., Weatherall, P. 2009. Global Bathymetry and Elevation Data at 30 Arc Seconds Resolution: SRTM30_PLUS, Marine Geodesy, 32:4, 355-371.

Hengl, T., Mendes de Jesus, J., Heuvelink, G.B.M., Gonzalez, M.R., Kilibarda, M., Blagotić A., Shangguan, W., Wright, M.N., Geng, X., Bauer-Marschallinger, B., Guevara, M.A., Vargas, R., MacMillan, R.A., Batjes, N.H., Leenaars, J.G.B., Ribeiro, E., Wheeler, I., Mantel, S., Kempen, B. 2017. SoilGrids250m: Global gridded soil information based on machine learning. PLoS ONE, 12(2): e0169748 [online]. [cited 16 February 2017]. https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0169748#abstract0

Intergovernmental Panel on Climate Change (IPCC). 2003. Report on Good Practice Guidance for Land Use, Land-Use Change and Forestry. Chapter 2: Basis for Consistent Representation of Land Areas. 29 pp. Available at https://www.ipcc-nggip.iges.or.jp/public/gpglulucf/gpglulucf_files/Chp2/Chp2_Land_Areas.pdf

Natural Earth. Natural and artificial lakes. Available at https://www.naturalearthdata.com/downloads/10m-physical-vectors/10m-lakes/

Sacande, M., Parfondry, M., Martucci, A. 2020. Diversity of restoration plants for Africa's Great Green Wall implementation. Nature & Faune, 33, 89-100. http://www.fao.org/3/ca8253en/ca8253en.pdf

Soto-Navarro, C., Ravilious, C., Arnell, A., de Lamo, X., Harfoot, M., Hill, S.L.L., Wearn, O.R., Santoro, M., Bouvet, A., Mermoz, S., Le Toan, T., Xia, J., Liu, S., Yuan, W., Spawn, S.A., Gibbs, H.K., Ferrier, S., Harwood, T., Alkemade, R., Schipper, A.M., Schmidt-Traub, G., Strassburg, B., Miles, L., Burgess, N.D., Kapos, V. 2020. Mapping co-benefits for carbon storage and biodiversity to inform conservation policy and action. Philosophical Transactions of the Royal Society B. 375. https://royalsocietypublishing.org/doi/10.1098/rstb.2019.0128

United Nations. 2020. Map of the World [online]. un.org/geospatial/file/3420/download?token=bZe9T8I9

United Nations Environment Programme -World Conservation Monitoring Centre (UNEP-WCMC). 2007. A spatial analysis approach to the global delineation of dryland areas of relevance to the CBD Programme of Work on Dry and Subhumid Lands. Cambridge, UK. https://www.unep-wcmc.org/resources-and-data/world-dryland-areas-according-to-unccd-and-cbd-

The Africa Open DEAL initiative is a collaborative effort of the African Union, FAO, Google and all the governmental and regional counterparts of the African countries who joined the initiative. It is implemented thanks to synergies among partners and ongoing FAO and AUC supported projects, namely:

- **The "National Land Monitoring and Information System for a transparent NDC reporting" project implemented by the FAO Office of Climate Change, Biodiversity and Environment in collaboration with Google and funded by Germany's Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety.**
- **The Action Against Desertification programme in support of Africa's Great Green Wall initiative and south-south cooperation implemented by the FAO Forestry Division in close collaboration with country offices, with the support of the European Union, the Government of Turkey, AUC, OACPS Secretariat and PA-GGW.**
- **The Panafrican Agency and the National Agencies of the Great Green Wall and the Southern African Development Community.**
- **The African Union and FAO regional office for Africa, jointly implementing the Regional Technical Cooperation Programme (TCP) project - Supporting the African Union Commission and countries in the formulation and tracking the progress of NDC implementation plans in Africa.**

Disclaimer: the views expressed herein can in no way be taken to reflect the official opinion of the African Union, the European Union or FAO.

The boundaries and names shown and the designations used on these maps do not imply the expression of any opinion whatsoever on the part of FAO concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers and boundaries. Dashed lines on maps represent approximate border lines for which there may not yet be full agreement.

This publication was produced with the financial assistance of the European Union, Turkey, Germany and FAO regional technical cooperation programme.

Some rights reserved. This work is available under a CC BY-NC-SA 3.0 IGO licence

© FAO, 2021
CB5896EN/1/08.21