

An aerial photograph of a vast, hilly landscape covered in dense green forest. The terrain is undulating, with various shades of green indicating different vegetation types or forest health. In the foreground, a darker, more textured green area is overlaid with a map-like pattern, showing a network of lines and patches that likely represent forest cover data. The background shows more distant, forested hills under a cloudy sky.

## 19/11/2019 Forest Cover Map

Presented by:

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# Mapping team

- Supervisors
- GIS technicians
- Steering Committee
  - RWFA
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# I. Forest cover mapping

- Background and rationale
- Results on forest cover 2018/2019
- Results on forest density 2018/2019
- Afforestation 2009 - 2019
- Deforestation 2009 - 2019

# Rationale

- Rwanda pledges to reach 30% of forest cover by 2020
- Promoting private sector involvement in the management of public forests require to have a detailed forest distribution and productivity
- The existing reliable forest cover map of Rwanda was produced in 2012 by the GIS Centre of the National University of Rwanda (CGIS-NUR), based on orthophotos of 25cm resolution provided by RNRA. This map is 10 years old now and did not include areas below 0.25 ha.
- Need to quantify changes (afforestation & deforestation & change of land uses) that have happened between 2009 and 2019 for future management and restoration plans
- Accurate update of forest cover is done to update the 2012 forest cover map as a new baseline for NSTI (2024); SDGs monitoring system (2030), Bonn Challenge on Landscape Restoration programs, Erosion control etc.

# Data and Methods

- World View images of 30-50cm resolution (2016 – 2019) available at NISR;
- Forest cover map 2008/2009 (CGIS-NUR, 2012);
- Use on screen digitization techniques to map:
  - Natural forest
  - Forest plantation
  - Bamboo stand
  - Wooded savannah
  - Shrubland
  - Very degraded shrubland
- Develop the forest geodatabase
- Forest cover mapping 2018/19 included very small woodlots (< 0.25 ha); river and lake side buffers, urban parks and road side tree plantations

# Forest cover density

Forest Cover	Density
Natural Forest	1. Very low (0-10%) 2. Low (10-40%) 3. Medium (40-70%) 4. High (> 70%)
Forest plantations	
Wooded savannah	
Bamboo stand	
Shrubland	

# High density (>70%)



**Forest plantation**



**Savannah woodland**

# Medium density (40-70%)

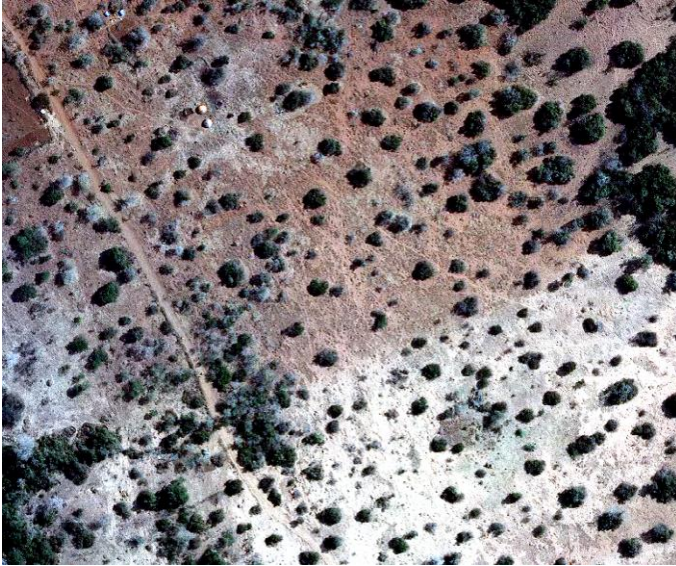


**Savannah woodland**



**Forest plantation**

# Low density (10-40%)



**Savannah woodland**



**Forest plantation**

# Results: I. Forest cover maps

- [20190410 Forest cover map of City of Kigali.pdf](#)
- [20191004 Forest cover map of Eastern Province.pdf](#)
- [20191004 Forest cover map of Northern Province.pdf](#)
- [20191004 Forest cover map of Southern Province.pdf](#)
- [20191004 Forest cover map of Western Province.pdf](#)

# Statistics: 2. Forest cover types

Forest Cover Type	Forest area (Ha) per density category (%)					%
	High (>70%)	Low (10 - 40%)	Medium (40 - 70%)	Very low (0 - 10%)	Grand Total	
Bamboo stand	410	39	149	15	613	0.1%
Forest plantation	169,971	48,816	156,625	11,978	387,389	53%
Natural forest	127,331	2,852	8,254	473	138,910	19%
Shrubland	2,493	13,206	24,386	2,230	42,315	6%
Very degraded shrubland	25	585	84	954	1,648	0.2%
Wooded savannah	8,175	83,462	50,813	11,336	153,785	21%
<b>Grand Total</b>	<b>308,404</b>	<b>148,960</b>	<b>240,312</b>	<b>26,987</b>	<b>724,662</b>	<b>100%</b>

### 3. Classification of forest plantation by size of forest

<b>Classes</b>	<b>Total (Ha)</b>	<b>Percentage (%)</b>
Less than 0.25ha	11,798	3%
Between 0.25 and 0.5ha	16,462	4%
Between 0.5 and 1 ha	26,953	7%
Between 1 and 2 ha	37,818	10%
Forest greater than 2ha	294,358	76%
<b>Grand Total</b>	<b>387,389</b>	<b>100%</b>

# Statistics: 4. Forest cover per District

District Name	District land water bodies excuded (Ha)	Forest Cover Type (Ha)						Total forest	
		Bamboo stand	Forest plantation	Natural forest	Shrubland	Very degraded shrubland	Wooded savannah	Area (Hectares)	Percent (%)
NYARUGURU	101,027	1	33,957	21,801	0			55,759	55%
RUSIZI	91,731	49	13,034	35,181				48,263	53%
NYAMAGABE	109,036	0	32,972	21,046	0			54,018	50%
NYAMASHEKE	94,802	12	21,327	23,595	989			45,922	48%
KAYONZA	179,128	4	10,516	1,859	20,144	185	47,943	80,651	45%
GATSIBO	154,667	4	12,454	60	2,420	22	52,007	66,966	43%
MUSANZE	50,717	27	8,099	9,963	0	2		18,091	36%
NYAGATARE	191,333	0	12,315	8,872	2,612	66	43,036	66,901	35%
RUTSIRO	65,995		16,342	3,683				20,025	30%
KARONGI	79,298	2	22,709	1,070	121	3		23,905	30%
NYABIHU	52,958	50	10,472	4,473		6	0	15,001	28%
GICUMBI	82,721	0	23,024					23,024	28%
MUHAMGA	64,772	2	16,963	155				17,120	26%
RULINDO	56,699	64	14,665			0		14,729	26%
GAKENKE	70,325	43	17,777			1		17,822	25%
HUYE	58,153		14,448	4	237			14,688	25%
NGORORERO	67,899	28	14,556	207		2		14,793	22%
NYARUGENGE	13,395	59	2,777		0			2,836	21%
BURERA	58,856	9	10,224	1,777		9		12,019	20%
GASABO	42,763	74	8,219		87	1		8,381	20%
RUBAVU	34,090	2	5,451	804		1	1	6,258	18%
BUGESERA	122,543	4	6,508	3	2,966	1,215	10,782	21,479	18%
KIREHE	115,813		5,515	4,340	9,734			19,589	17%
RUHANGO	62,678	0	8,958		6	1		8,965	14%
KAMONYI	65,553	49	8,796		160	7	4	9,016	14%
RWAMAGANA	65,627		8,612		318	3		8,933	14%
NYANZA	67,215	10	8,375	1	560		4	8,949	13%
GISAGARA	67,920		8,214	7	742	56	1	9,021	13%
NGOMA	81,445	123	8,730	9	1,177	67	7	10,112	12%
KICUKIRO	16,671		1,384		40			1,424	9%
<b>Grand Total</b>	<b>2,385,830</b>	<b>613</b>	<b>387,389</b>	<b>138,910</b>	<b>42,315</b>	<b>1,648</b>	<b>153,785</b>	<b>724,662</b>	<b>30.4%</b>

# Statistics: 6. Forest cover change over a decade (2009-2019)

## Change over 10 years (2009 and 2018)


<b>Forest cover change</b>	<b>Total (Ha)</b>	<b>Percent %</b>
Deforested area	102,106	15%
New forested area	153,251	23%
No change	571,411	85%
<b>Forest cover in 2019</b>	<b>724,662</b>	<b>51,145</b>
<b>Forest cover in 2009</b>	<b>673,517</b>	<b>8%</b>

# 7. Forest cover change over a decade (2009-2019) per District

District Name	Forest area 2019 (Ha)	Forest area 2009 (Ha)	Comparison between 2009 and 2019			Percentage of change			
			Deforested area (Ha)	New forest area (Ha)	No change (Ha)	Overall change	Deforestat ion (%)	Afforestati on (%)	% of change
BUGESERA	21,479	20,922	4,509	5,066	16,413	557	22%	24%	3%
BURERA	12,019	8,057	409	4,371	7,648	3,962	5%	54%	49%
GAKENKE	17,822	14,874	1,513	4,461	13,360	2,948	10%	30%	20%
GASABO	8,381	7,211	1,337	2,507	5,874	1,170	19%	35%	16%
GATSIBO	66,966	66,994	4,608	4,580	62,386	-28	7%	7%	0%
GICUMBI	23,024	16,521	1,275	7,778	15,247	6,503	8%	47%	39%
GISAGARA	9,021	8,204	2,553	3,370	5,650	817	31%	41%	10%
HUYE	14,688	11,662	1,480	4,506	10,182	3,026	13%	39%	26%
KAMONYI	9,016	7,630	1,214	2,600	6,416	1,386	16%	34%	18%
KARONGI	23,905	20,990	3,326	6,241	17,664	2,914	16%	30%	14%
KAYONZA	80,651	93,205	18,071	5,518	75,134	-12,554	19%	6%	-13%
KICUKIRO	1,424	1,504	525	445	979	-80	35%	30%	-5%
KIREHE	19,589	24,431	8,817	3,975	15,614	-4,842	36%	16%	-20%
MUHAMGA	17,120	13,848	1,999	5,271	11,849	3,272	14%	38%	24%
MUSANZE	18,091	15,113	595	3,574	14,518	2,979	4%	24%	20%
NGOMA	10,112	6,376	1,953	5,690	4,422	3,736	31%	89%	59%
NGORORERO	14,793	11,713	1,600	4,680	10,113	3,080	14%	40%	26%
NYABIHU	15,001	11,449	625	4,176	10,824	3,551	5%	36%	31%
NYAGATARE	66,901	78,848	26,479	14,532	52,369	-11,947	34%	18%	-15%
NYAMAGABE	54,018	48,865	3,081	8,235	45,783	5,154	6%	17%	11%
NYAMASHEKE	45,922	41,692	3,947	8,177	37,745	4,230	9%	20%	10%
NYANZA	8,949	7,623	1,521	2,847	6,102	1,326	20%	37%	17%
NYARUGENGE	2,836	2,684	558	710	2,126	151	21%	26%	6%
NYARUGURU	55,759	48,504	2,910	10,165	45,594	7,255	6%	21%	15%
RUBAVU	6,258	3,488	615	3,385	2,873	2,770	18%	97%	79%
RUHANGO	8,965	6,860	1,358	3,463	5,503	2,105	20%	50%	31%
RULINDO	14,729	11,964	893	3,658	11,071	2,765	7%	31%	23%
RUSIZI	48,263	43,854	2,014	6,423	41,840	4,409	5%	15%	10%
RUTSIRO	20,025	12,970	1,500	8,555	11,470	7,055	12%	66%	54%
RWAMAGANA	8,933	5,459	820	4,294	4,639	3,474	15%	79%	64%
Grand Total	724,662	673,517	102,106	153,251	571,411	51,145	15%	23%	8%

## 8. Key highlights



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- **Forests** occupy about **724,662 Ha** equivalent to **30.4%** of the country land - of which 53 % are plantations, 21% are wooded savannahs in East, 19% are natural mountain rainforests and 6.2% are shrubs.
  - Top 10 districts with 30-55% forest cover, are those with large part of their land occupied by protected natural mountain rain-forests and woodland Savannah.
  - **Afforestation** estimated to be **23%** taking place in all districts with Rubavu having a lion lead of (79%), Rwamagana following closely with (64%), Ngoma (59%), Rutsiro (54%) and Burera (49%) being the top five.
  - **Deforestation:** rate is about **15%** in which Kirehe, Nyagatare and Kayonza have a share of 20%, 15% and 13% respectively.
  - **Net gain:** still positive which is at **8%** over a decade from **2009** to **2019**.

## 8. Is this better for you?

- Forests occupy about 724,662 hectares (i.e. 30.4% of the country land) of which 53 % are plantations, 21% are wooded savannahs in East, 19% are natural mountain rainforests and 6.2% are shrubs.
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- Afforestation is estimated to 23% taking place in all districts with Rubavu (79%), Rwamagana (64%) , Ngoma (59%), Rutsiro (54%) and Burera (49%) being the top five.
- Deforestation rate is about 15% which took place in eastern Kirehe (20%), Nyagatare (15%) and Kayonza (13%).  
Nevertheless, the net balance still positive (8%) over a decade from 2009 to 2019



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Thanks for your attention!

