



Food and Agriculture Organization  
of the United Nations

# FINAL REPORT

## Sudan National Forest Inventory

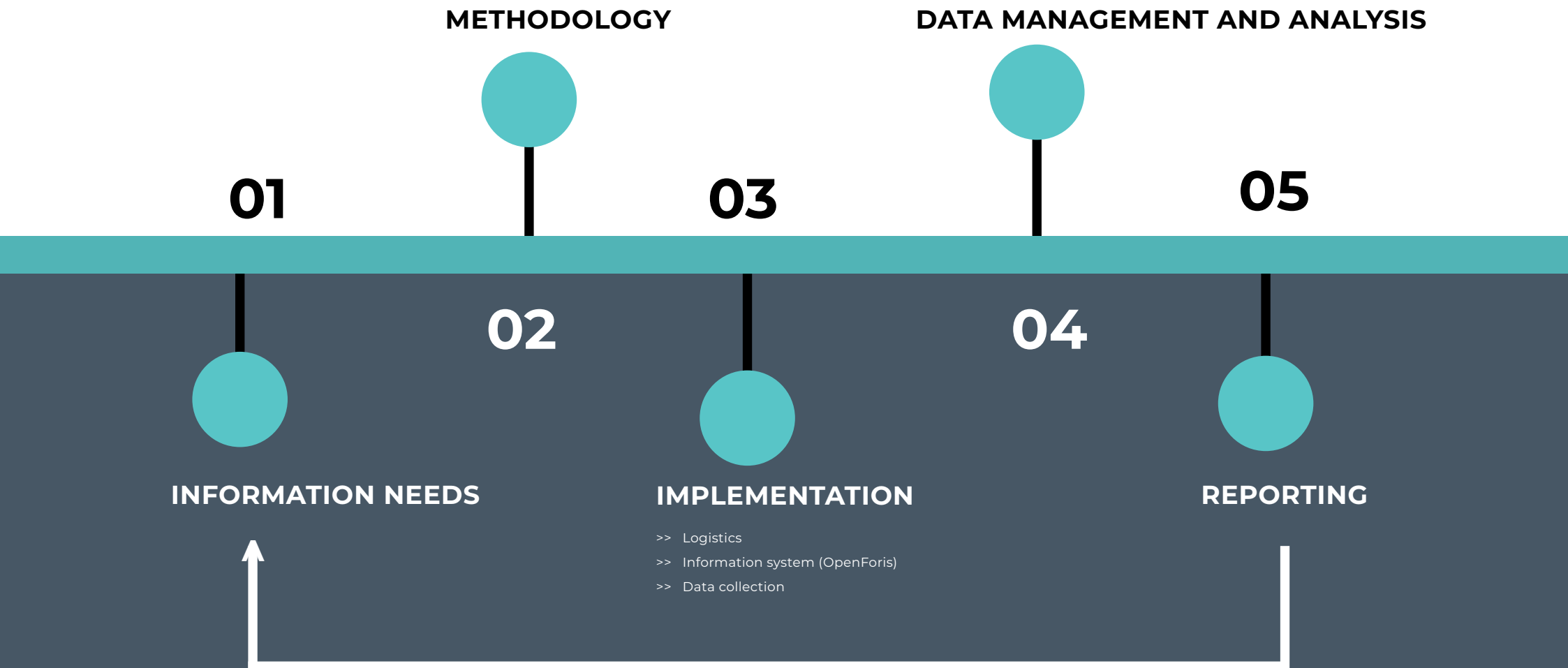
Key results



10.02.2021

# SUDAN NFI

## A LONG JOURNEY



# SUDAN

## FRA 2020 DATA

Sudan

Select geographical area

 Sudan ▼

FRA 2020



Show all

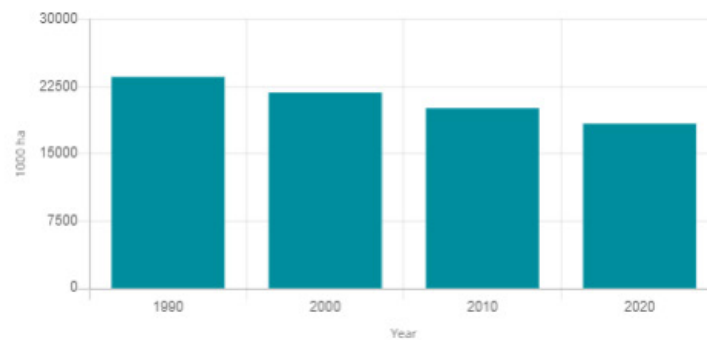
Introduction

Introduction

- 1 Forest extent, characteristics and changes
- 2 Forest growing stock, biomass and carbon
- 3 Forest designation and management
- 4 Forest ownership and management rights
- 5 Forest disturbances
- 6 Forest policy and legislation
- 7 Employment, education and NWFP
- 8 Sustainable Development Goal 15

### Sudan

Forest Area (1990 — 2020)



Forest growing stock and carbon (1990 — 2020)

[↓ CSV](#)

	1990	2000	2010	2020
Growing stock (million m <sup>3</sup> over bark)	471.41	436.52	401.62	367.19
Carbon stock in biomass (tonnes/ha)	33.68	33.68	33.68	33.68
Total carbon stock (tonnes/ha)	33.68	33.68	33.68	33.68

Forest area % of land area (2020)



Primary forest % of forest area (2020)



# SUDAN NATIONAL FOREST INVENTORY

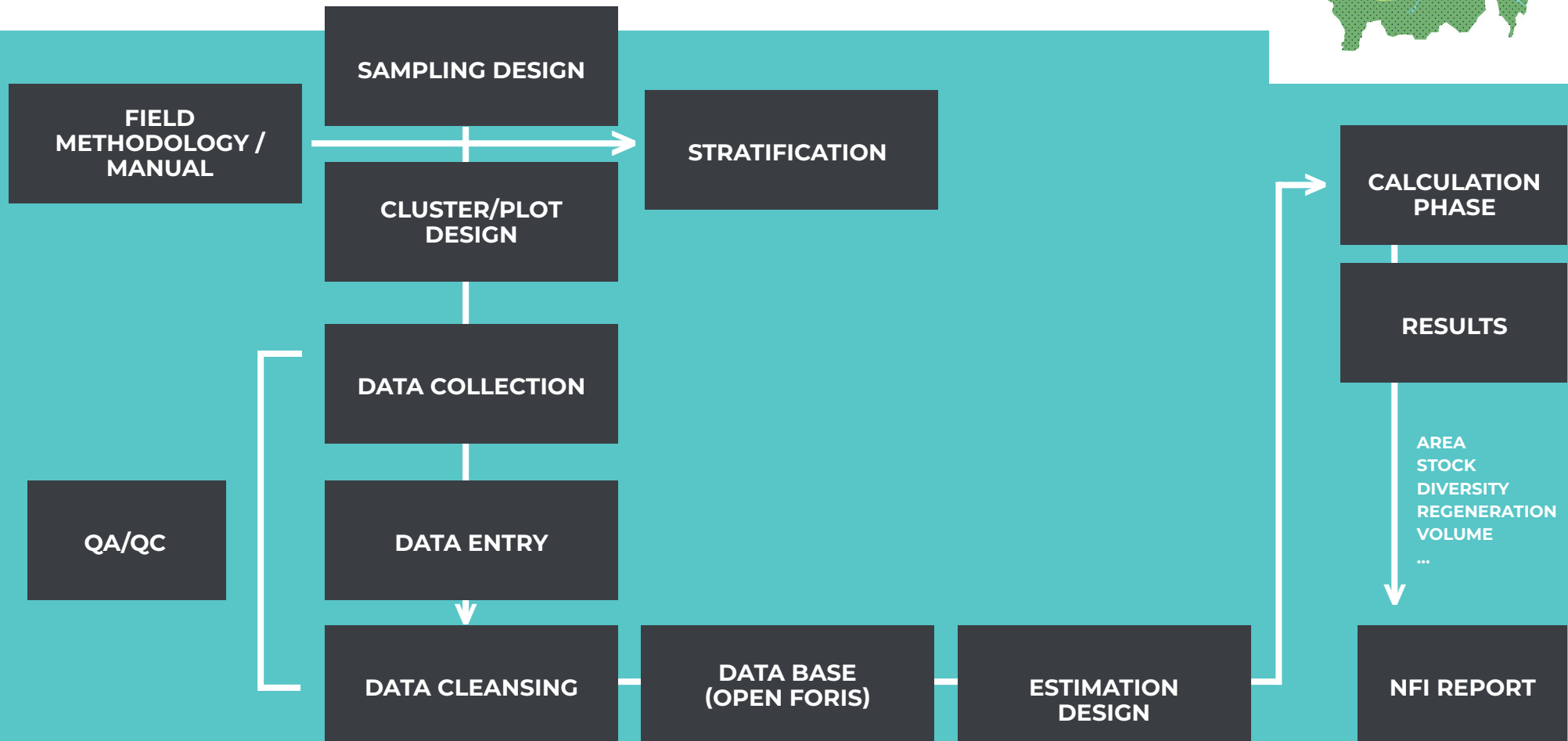
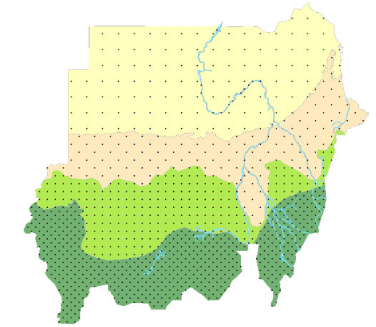
## FINAL REPORT



### REPORT CONTENT

- BACKGROUND OF FORESTRY CONTEXT IN SUDAN
- NFI PROJECT OBJECTIVES AND PROCESS
- METHODOLOGY
- RESULTS

# METHODOLOGY



Calculation phase performed by Mr. Asdrubal Calderon using  
 Silvametricus: <http://www.silvahn.com>  
 Supporting Document:  
 "Calculation Procedures Sudan National Forest Inventory (NFI-2020)"

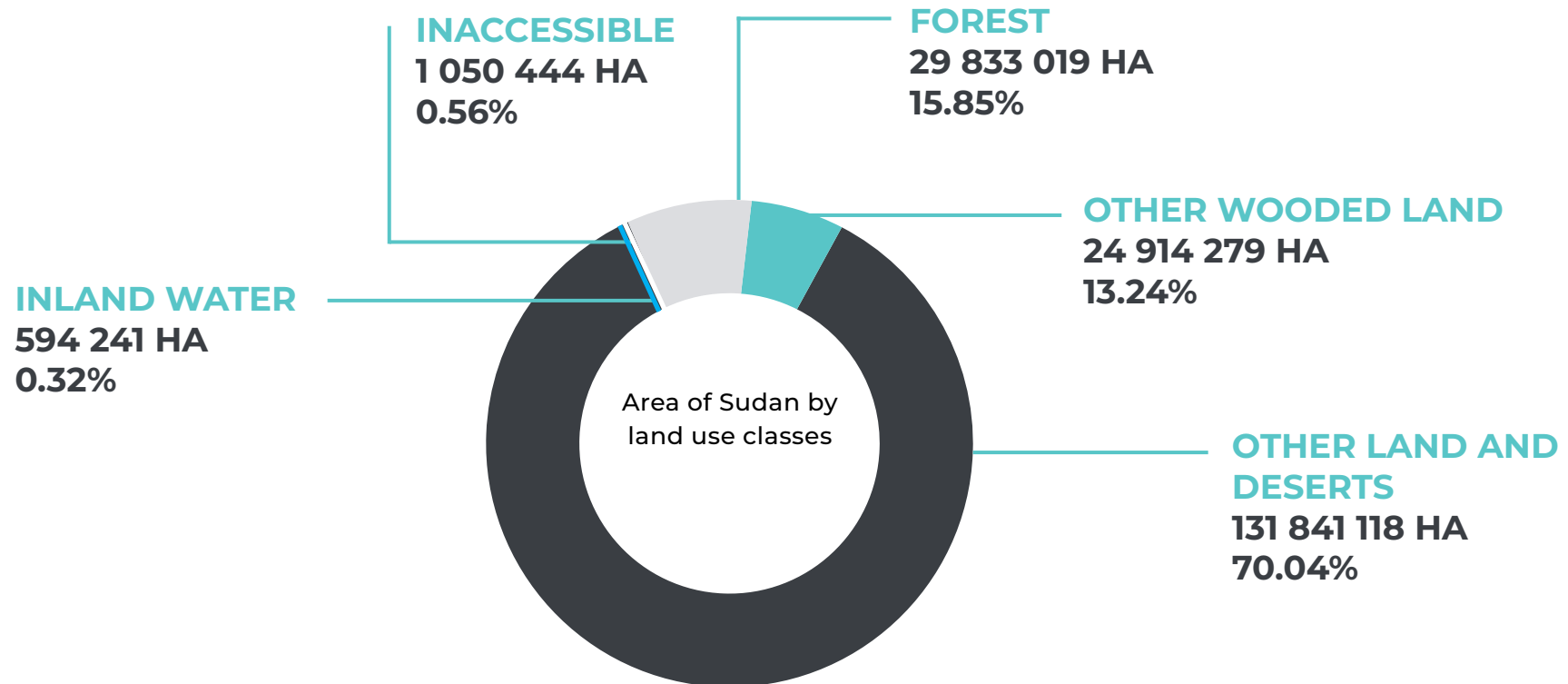
Area – Total and by State from Sudan Survey Authority (SSA)  
 Volume – form factor (ff) by species + Volume equations  
 Biomass – incl. AG and BG, equations from Chave et al. (2014) and  
 Wood Density by IPCC

# RESULTS

All estimates are presented by Strata, State, FRA class, LUC, etc.

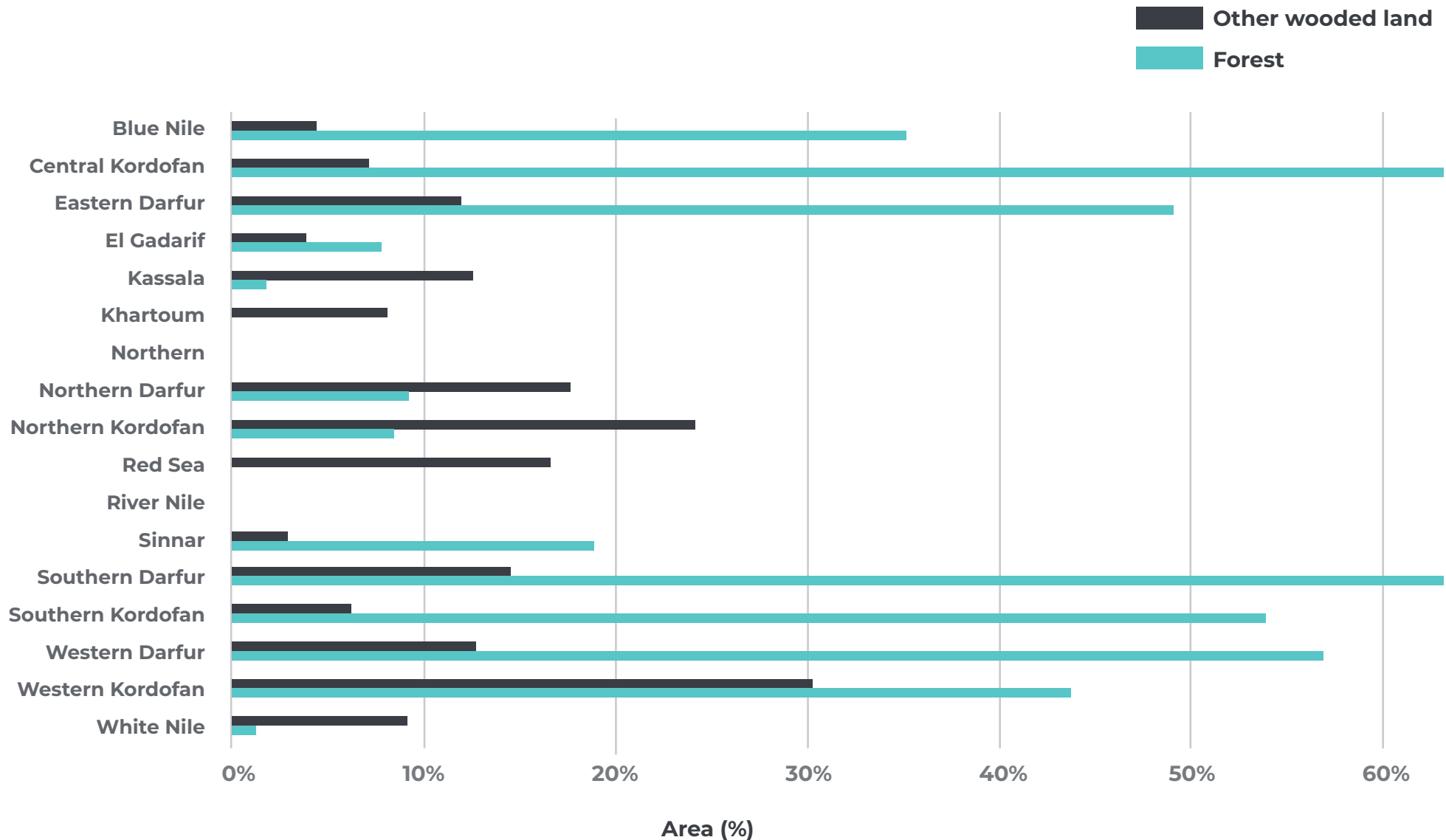
The NFI Report includes estimates for:

- Area, Canopy Cover, Fire Evidence, Tree density, Regeneration, Basal Area, Volume, Biomass, Carbon, Species and biodiversity, Products and Services.
- The data-base can (and should) be used for further analysis and investigations.



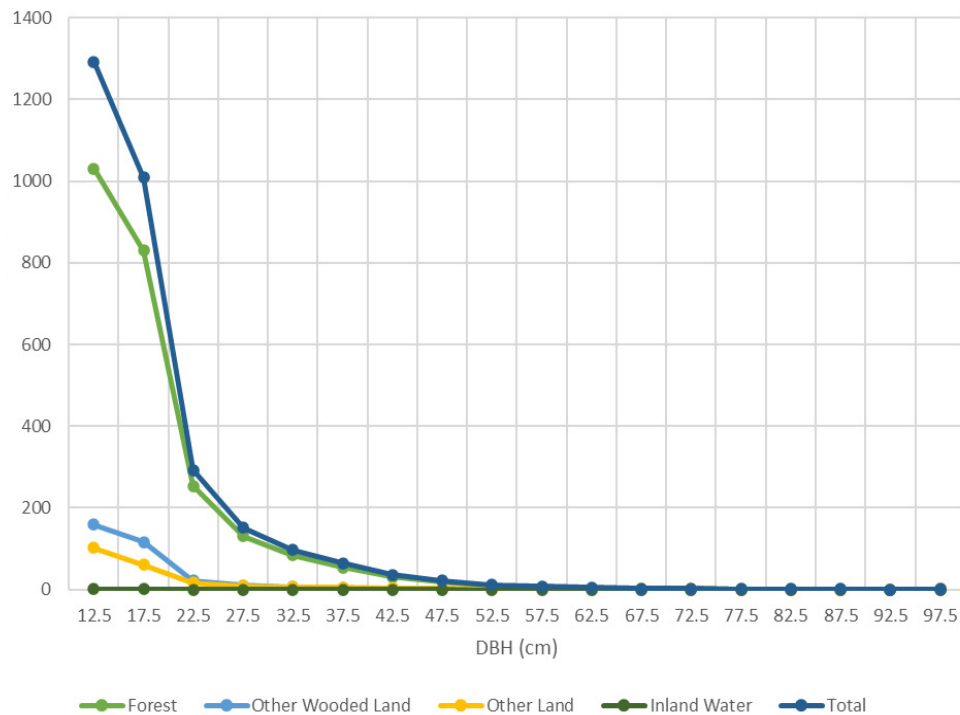
# KEY RESULTS: FOREST AND OTHER WOODED LAND AREAS BY STATE

Central Kordofan, Southern Darfur and Western Darfur are the most forested in Sudan (over 55% of the land is covered by forests)

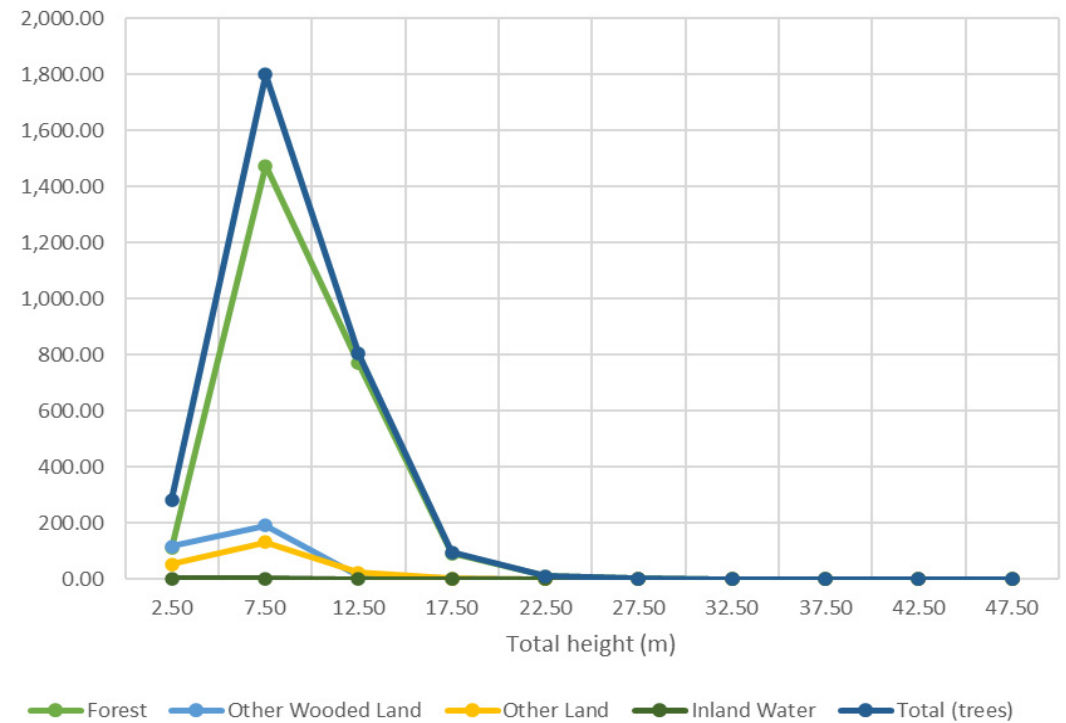


# Number of trees/ha by DBH class and Height class

## NUMBER FO TREES (TOTAL) BY DBH CLASSES



## TREES DENSITY BY FRA AND HEIGHT CLASSES





# REGENERATION BY FRA CLASSES, AND NATIONAL LUCS

LUC level 0	FRA classes (LUC level 1)	National land use classes		Regeneration mean (N/ha)
		LUC level 2	LUC level 3	
Forest	Forest	Natural regenerated forest	Other forest type	83.33
			Bamboo forest	0.00
			Deciduous forest	599.54
			Evergreen forest	835.56
			Raffia/palms	2 283.56
			Semi-deciduous forest	403.27
		Plantation	Broadleaved planted forest	0.00
			Coniferous planted forest	0.00

# REGENERATION BY SPECIES

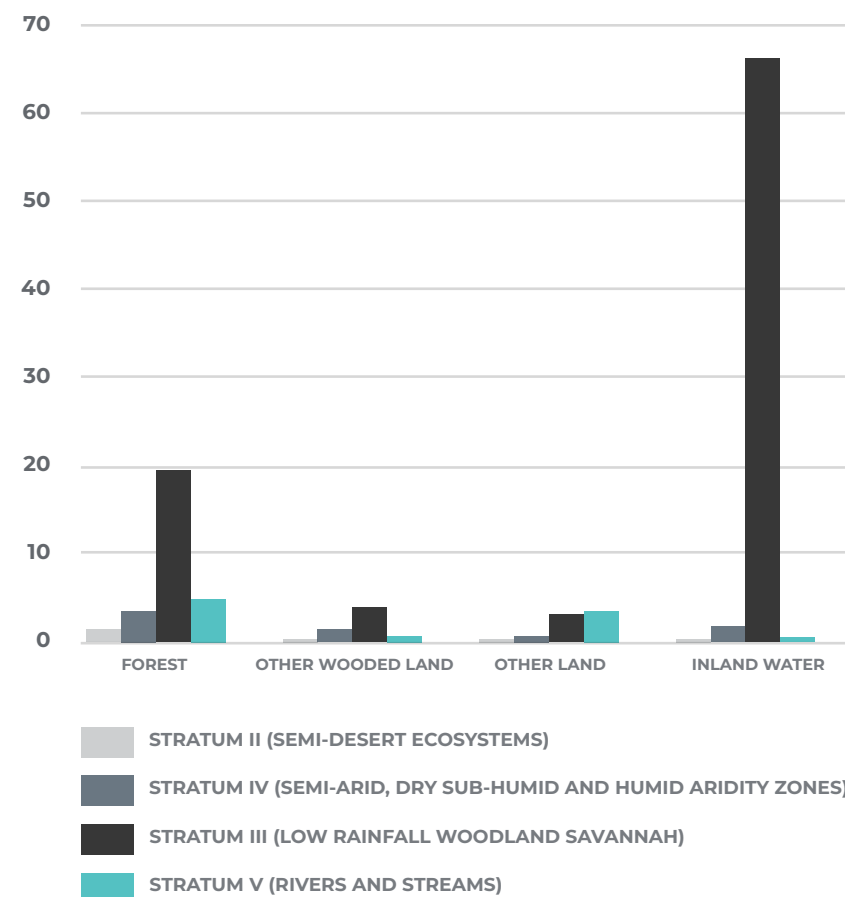
Species	FRA classes				Regeneration mean (N/ha)
	Forest	Other wooded land	Other land	Inland water	
<i>Suaeda monoica</i>	1 983.34				1 983.34
<i>Acacia tortilis</i> subsp. <i>spirocarpa</i>	133.33	1 762.96	1 674.18		1 644.36
<i>Boscia salicifolia</i>	1 616.67	200.00			908.34
<i>Lanea humilis</i>	616.67				616.67
<i>Acacia drepanolobium</i>	904.76	124.38	186.67		566.10
<i>Guiera senegalensis</i>	641.41	502.32	495.46		551.41
<i>Cassia siamea</i>	466.67				466.67
<i>Dichrostachys cinerea</i>	366.71	1 294.20	135.27	11 666.69	358.79
<i>Boswellia papyrifera</i>	333.33				333.33
<i>Combretum glutinosum</i>	300.00				300.00

# KEY RESULTS

## AVERAGE GROSS VOLUME/HA BY FRA CLASSES AND STRATA

- Forests cover is 29.8 million hectares, which accounts for 85.7% of the volume stock.
- Other wooded lands cover 24.9 million ha and contain 6.1% of the volume stock.
- The remaining 133.5 million ha are other land and inland water.

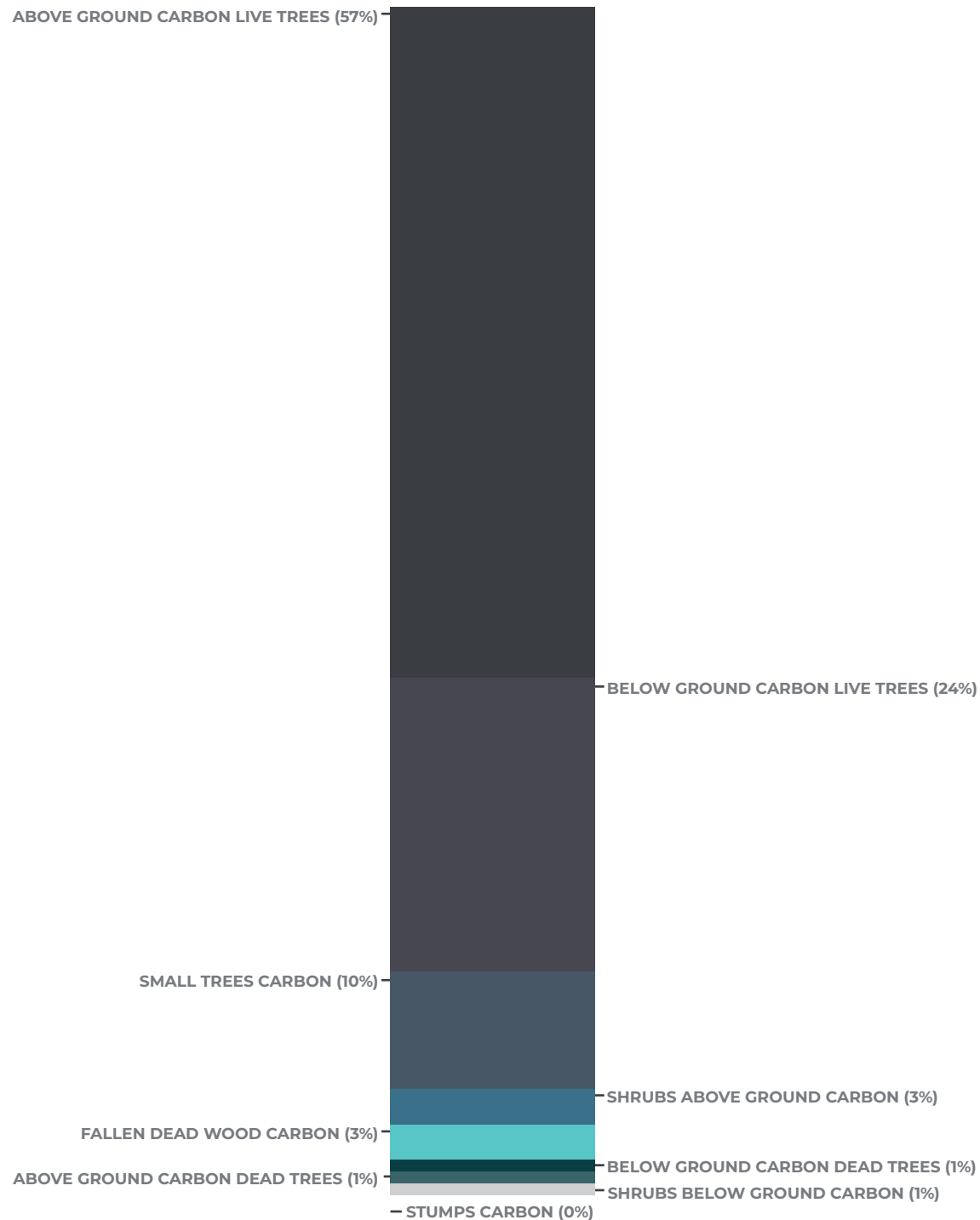
Strata	FRA classes				Volume mean (m <sup>3</sup> /ha)
	Forest	Other wooded land	Other land	Inland water	
Stratum II (semi-desert ecosystems)	0.000	0.6292	0.1189	0.000	0.1941
Stratum III (low rainfall woodland Savannah)	3.7528	1.4498	0.8950	1.7392	1.3562
Stratum IV (semi-arid, dry sub-humid and aridity zones)	19.5575	3.9496	3.4089	66.3402	11.7827
Stratum V (rivers and streams)	5.0514	1.0133	3.8071	0.0000	1.1220
Volume mean (m <sup>3</sup> /ha)	15.8129	1.311	0.6587	4.5879	4.6055



In Sudan the average gross volume per hectare is 4.6055 m<sup>3</sup>/ha. Forest is the LUC with the highest gross volume per hectare.

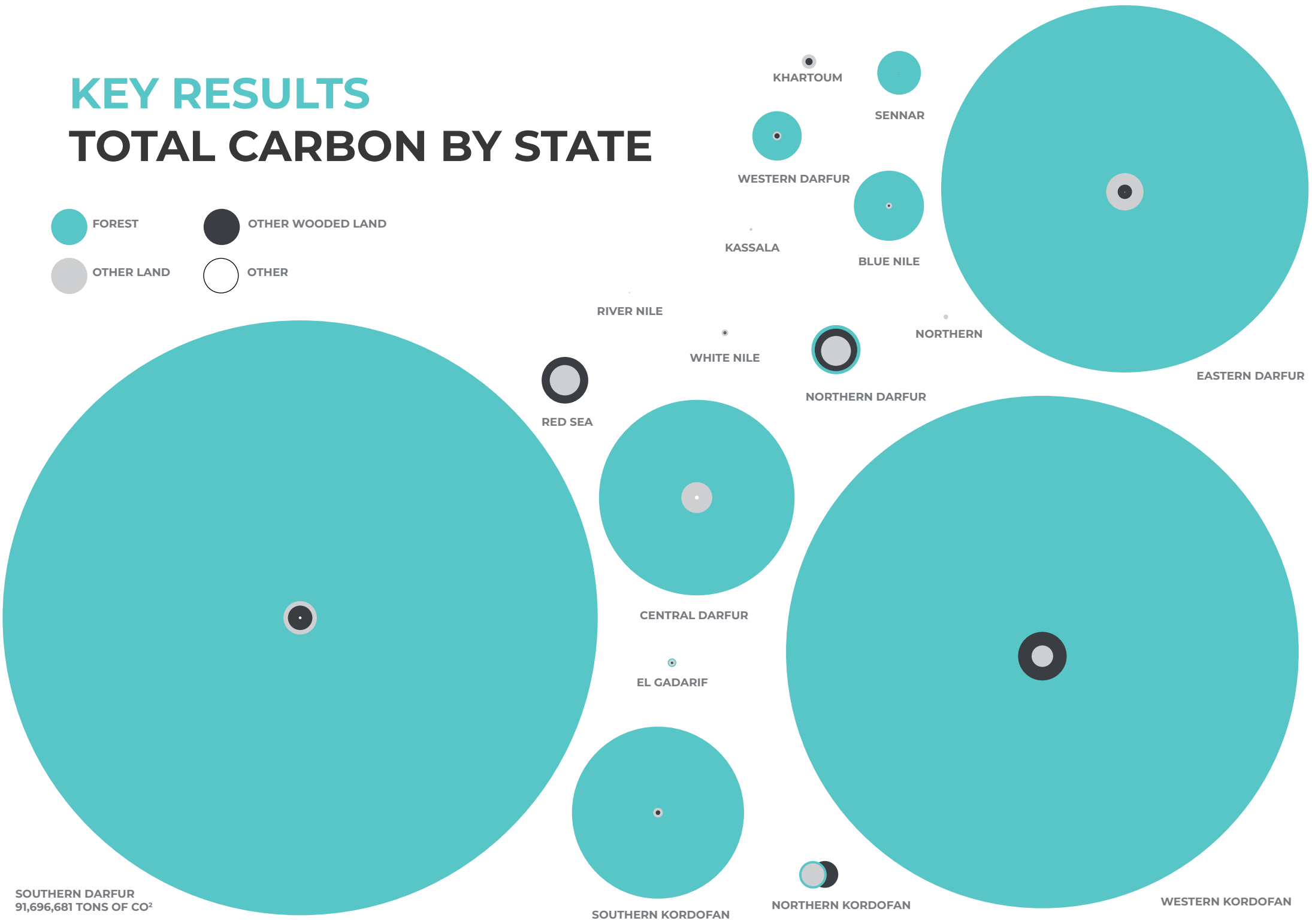
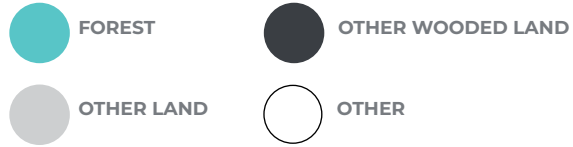
# KEY RESULTS

## CARBON STOCKS



# KEY RESULTS

## TOTAL CARBON BY STATE



SOUTHERN DARFUR  
91,696,681 TONS OF CO<sub>2</sub>

SOUTHERN KORDOFAN

NORTHERN KORDOFAN

WESTERN KORDOFAN

# KEY RESULTS

## TOTAL CARBON BY STATE

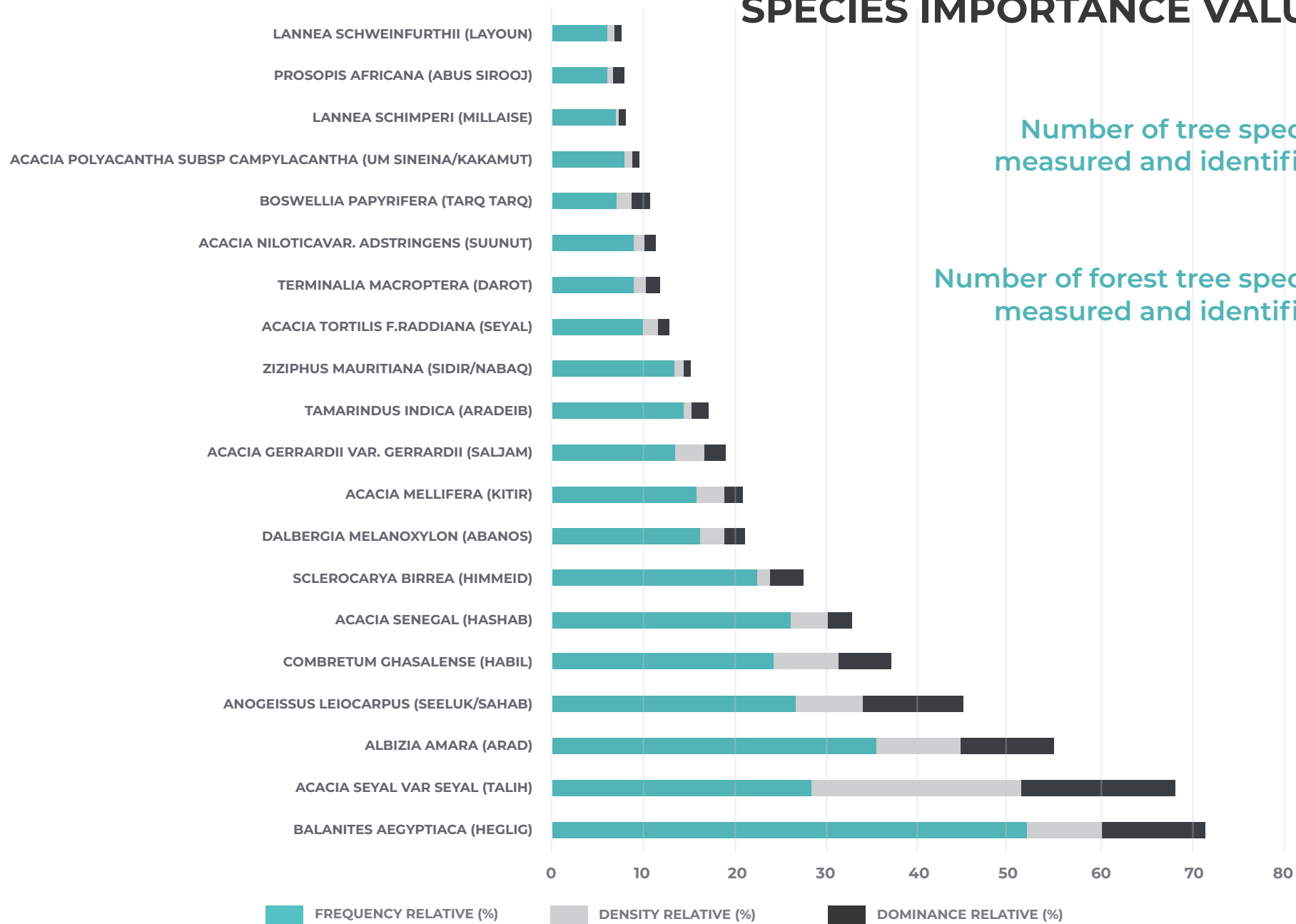
State	FRA Classes					Total (tons)	%
	Forest	Other Wooded Land	Other Land	Inland Water	Other		
Blue Nile	9,779,009	321,195	873,036	113,505	0	11,086,745	3.04
Central Darfur	27,277,532	1,010,501	4,314,928	547,211	111	33,150,283	9.08
Eastern Darfur	51,239,834	2,013,293	4,212,236	0	0	57,465,364	15.74
El Gadarif	1,193,972	327,819	927,274	50,941	100	2,500,105	0.68
Kassala	47,077	390,239	30,721	0	0	468,036	0.13
Khartoum	0	1,098,295	2,044,088	0	0	3,142,382	0.86
Northern	0	0	643,620	0	0	643,620	0.18
Northern Darfur	7,803,347	6,854,909	4,165,834	0	0	18,824,089	5.16
Northern Kordofan	3847,247	3,741,667	3,203,925	88,899	0	10,881,737	2.98
Red Sea	0	6,506,876	4,241,885	0	0	10,748,761	2.94
River Nile	0	0	193,896	0	0	193,896	0.05
Sennar	6,108,055	108,449	179,795	0	11,587	6,407,887	1.76
Southern Darfur	83,237,630	3,410,319	4,666,299	382,432	0	91,696,681	25.11
Southern Kordofan	24,185,215	639,684	1,359,000	0	5,961	26,189,860	7.17
Western Kordofan	71,569,916	6,787,353	3,030,489	0	249	81,388,008	22.29
Western Darfur	6,887,171	728,939	1,226,463	0	0	8,842,573	2.42
White Nile	159,388	407,577	921,354	0	0	1,488,318	0.41
<b>Total (tons)</b>	<b>293,335,393</b>	<b>34,347,115</b>	<b>36,234,842</b>	<b>1,182,987</b>	<b>18,007</b>	<b>365,118,345</b>	<b>100.00</b>

# KEY RESULTS

## SPECIES IMPORTANCE VALUE INDEX

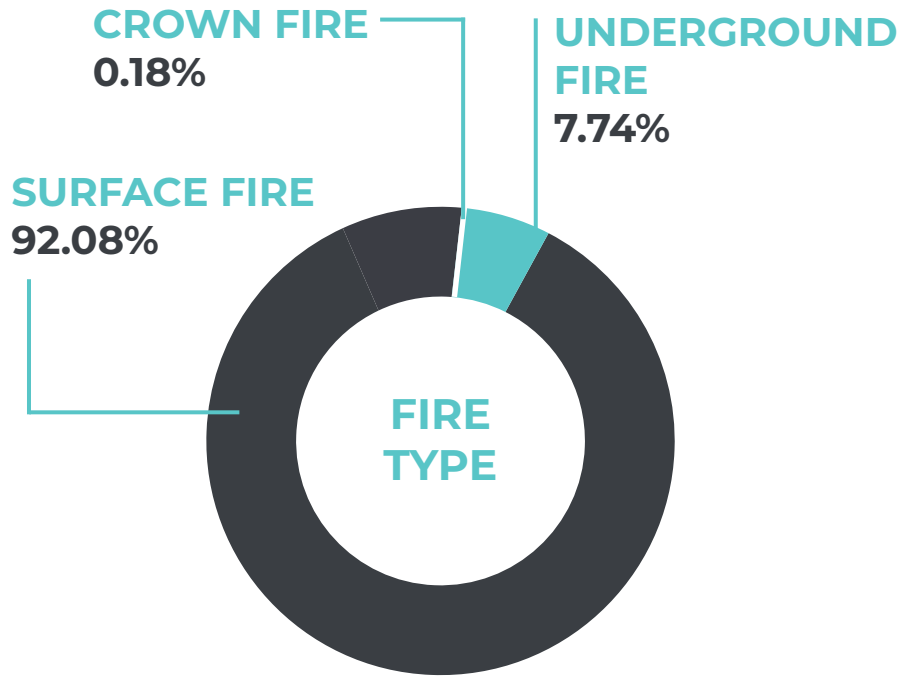
Number of tree species measured and identified: **319**

Number of forest tree species measured and identified: **142**

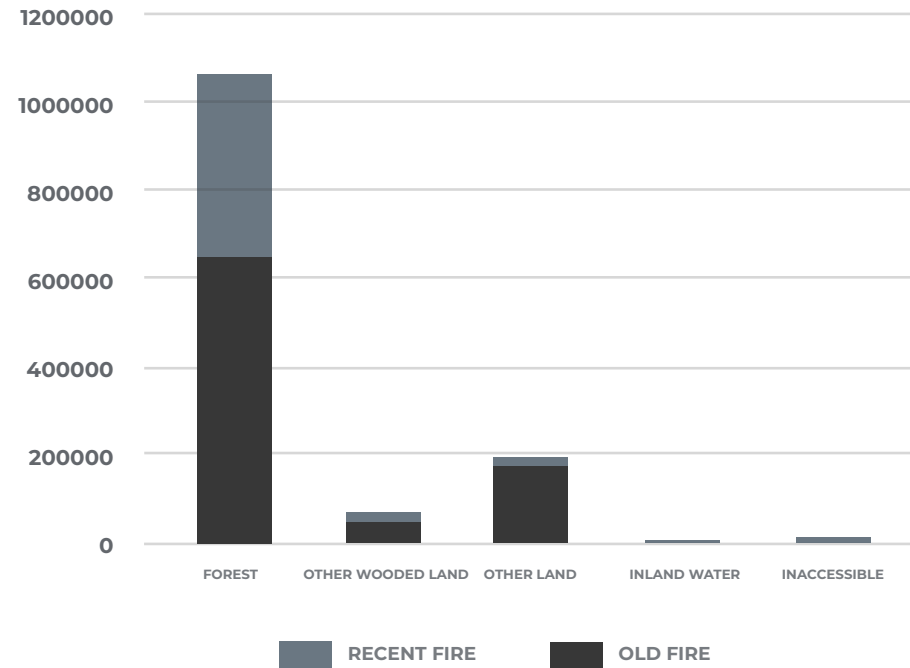


# KEY RESULTS

## FIRE EVIDENCE



Evidence of fire	FRA classes				Total
	Forest	Other wooded land	Other land	Inland water	
<b>Recent fire</b>	671,152	59,194	176,498	0.000	906,844
<b>Old fire</b>	413,155	14,949	19,651	1.7392	447,756
<b>Total</b>	1,084,307	74,144	196,149	66.3402	1,354,600

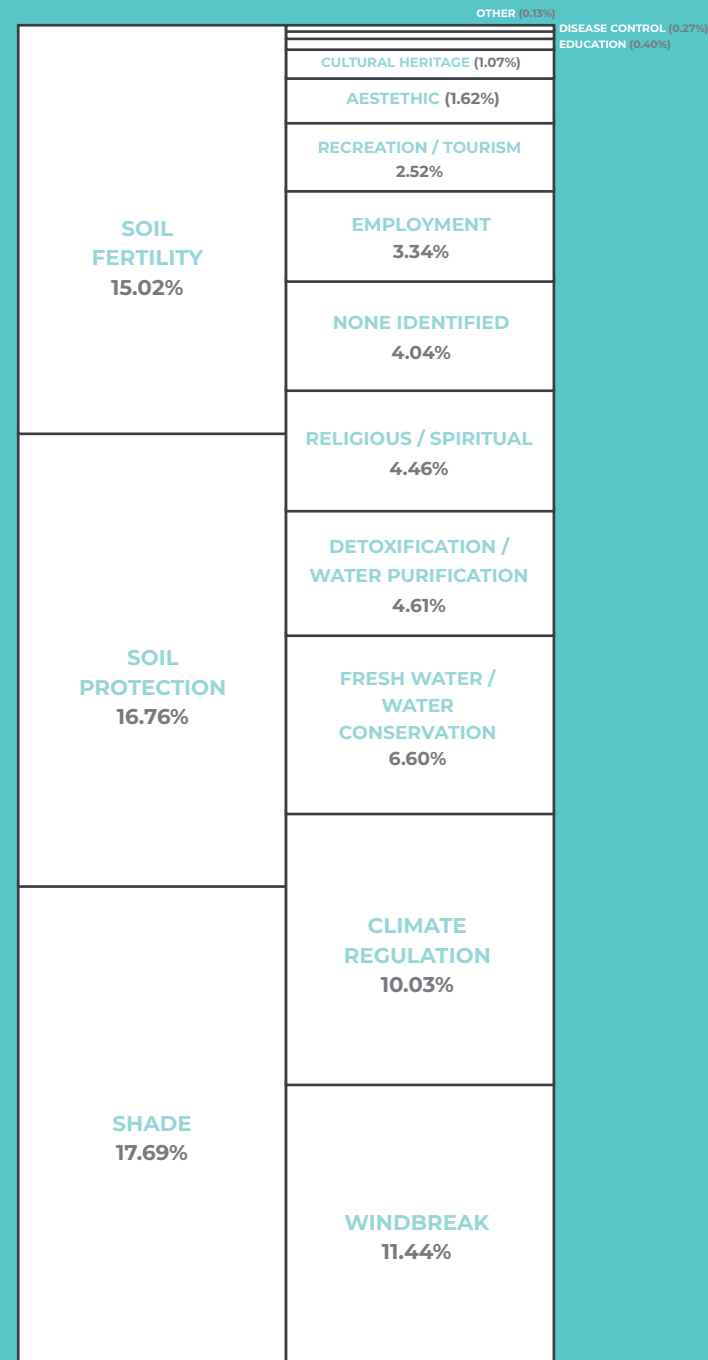
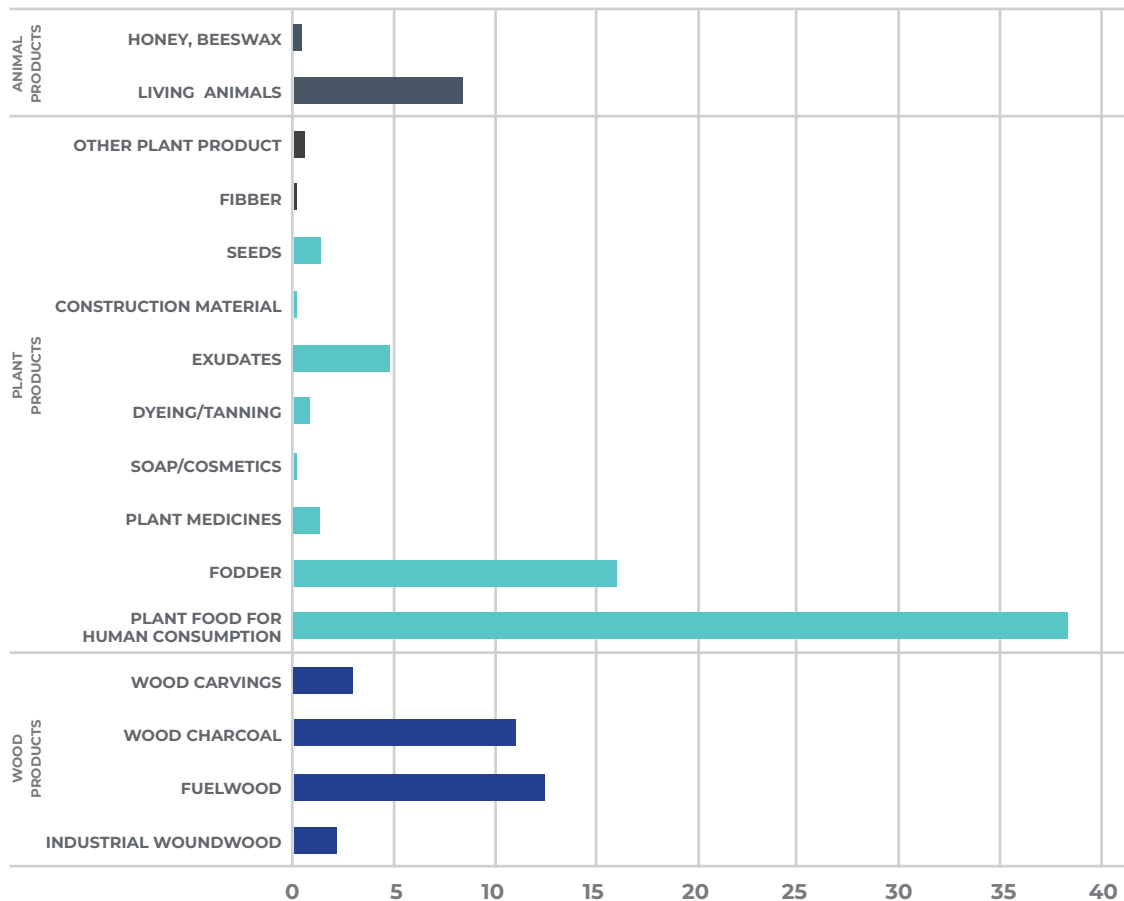


- Only 3.63% of the total forest area has experienced burning
- The most common type is surface fire



# KEY RESULTS

## PRODUCTS AND SERVICES (%)



# KEY RESULTS CONCLUSIONS

## SUDAN'S NATIONAL FOREST INVENTORY...

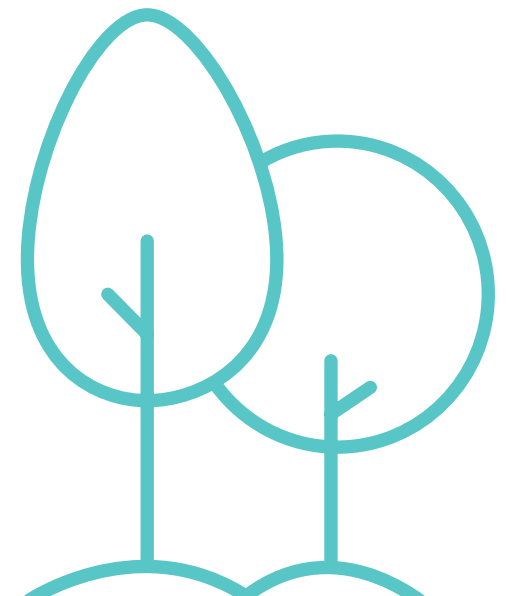
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- is a major achievement that supports the country in enhancing the sustainable management of its forest resources to reach various climate, environmental and livelihood goals;
- is a significant achievement for the country to enhance the sustainable management of its forest resources to reach multiple environmental and livelihood goals.
- is built on the accumulated experience of the FNC in systematic sampling.
- provides baseline information based on genuine ground measurements.
- has established a grid of permanent sample plots, geo-referenced, to be re-visited in future inventories.
- incorporated variables which made possible calculations of biomass and carbon stock complying with the international practices.
- generated new capacities at country level, knowledge and resources.
- paved the way for conducting systematic inventories at the sub-national level.
- is a crucial tool for sustainable forest management and to inform forest policy decisions.



# KEY RESULTS CONCLUSIONS

- The built capacity should be maintained and renewed with new generations of forestry professionals.
- The developed database should be maintained as a national asset and made available for further investigations (data sharing).
- Sub-sets of results should be prepared and packaged for various stakeholders (data dissemination).
- Additional variables and measurements can be added as new needs arise.
- Species identification should be strengthened to minimize the number of unknowns.
- Country specific allometric equations should be developed.



# CONTACT US



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