

The use of NAFORMA results for decision making



By Nurdin Chamuya (Head FRMA, and
Ag. Director for Planning and Resources Utilization – (TFS)

Forest and Development: From development discourses to providing data for decision making – HELSINKI, FINLAND 1ST MARCH, 2016

Introduction: General Forest information in TZ

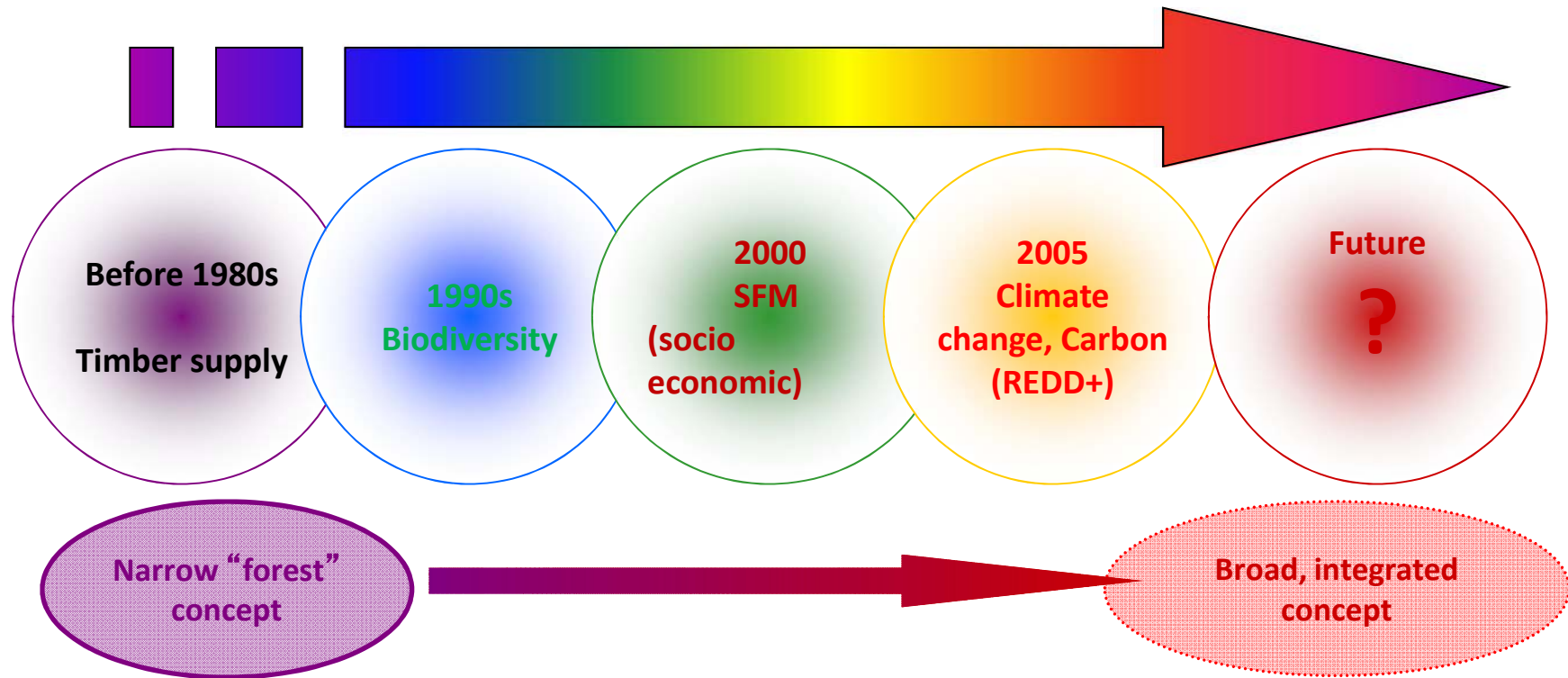
- The Tanzania is one of the countries endowed with high forest diversity in the World;
- The country has over 10,000 plant species;
- 305 are identified as threatened in the IUCN Red List;
- 276 species classified as Endangered and;
- Hundreds of this tree species are national endemic.



Vegetation types

- The main forest types include the deciduous Miombo woodlands, *Acacia-Commiphora* woodlands, woodland mosaics, coastal forests, the mangrove, closed canopy forests and plantation forests;
- Woodlands are the mostly degraded forest type;
- Subjected to frequent wildfires and other humans activities like shifting cultivation.

History NFI



While there is increasing data needs from FIs the capacity to collect, compile, analyze the data, and disseminate the results is often inadequate or lacking.

Importance of Forest Inventories

- FIs provide information useful for development of policies and sustainable forest management programmes
- To date, FIs provide information useful in, hydrology and soils conservation programmes, urban/rural development planning, and Agriculture and livestock development.

Pre NAFORMA FI

- 1971 -1973, Govt. with financial support from CIDA conducted a reconnaissance indigenous forest inventory in Kilimanjaro, Tanga, Kilombero, Tabora and Mtwara;
- 1975-1980, Jaakko Poyry conducted an industrial inventory in the same Regions;
- 1996, Govt with Sida support conducted a reconnaissance forest inventory in Singida, Arusha and Dodoma regions;
- 1999, the FBD conducted a study on the status of non timber forest products in Tanzania;
- 2005, FBD conducted a reconnaissance forest inventory in 11 districts namely Liwale, Mkuranga, Tunduru, Nachingwea, Rufiji, Kilwa, Kisarawe in the Southern zone and Kilombero/Ifakara and Mvomero in the Eastern zone; Handeni/Kilindi in the Northern zone and Mpanda in the Western zone.

NAFORMA Scope

- The National Forest Resources Monitoring and Assessment (NAFORMA) is the first ground based forest inventory conducted to the entire country.
- The aforementioned pre NAFORMA inventories were conducted at specific areas for specific reasons;
- They provided useful information during development and designing of NAFORMA methodology.

Main Objective

- The main objective of NAFORMA is to collect timely, relevant and reliable baseline information on the state, extent and uses of the forest resources in Tanzania Mainland useful for decision making and development of relevant policies and programmes in order to achieve a more sustainable forest management.

Immediate Objectives

- To establish an agreed NAFORMA process and approach;
- To increase capacity of Tanzanian foresters to collect, analyze, update and manage information;
- To develop a national database/dataset on forests and trees;
- To produce national maps of forests and land uses;

Objectives

- To conduct forest assessment and establish long term monitoring system;
- To define long term monitoring programme and design specific and management oriented inventories; and
- To develop tools and methods for measuring, reporting and verification (MRV) of Carbon sequestration

Methodology development

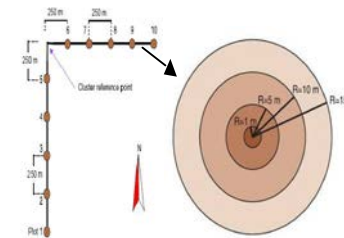
- Initially, a dense grid of plots was overlaid on the map of Tanzania Mainland at distances of 5 km x 5 km between the plots
- This made the first phase sample size.
- Development of the second phase sample involved production of growing stock map, stratifying the country into 18 strata, and assessing accessibility and slope of different each stratum.

Methodology development

- The second phase sample plots were systematically selected from the first phase sample after considering the mentioned criteria.
- Higher sampling intensity was allocated to strata with high variation and predicted growing stock and vice versa.
- The selected statistical framework was double sampling for stratification;

Cluster and Plot design

- concentric circular sample plot
- The plots were grouped in L-shaped clusters.
- The number of plots in a cluster varied from 6 to 10,
- Number of plots per cluster in a stratum was always the same.
- The distance between plots within a cluster was 250 m
- The distance between clusters varied from 5 to 45 Kms



Cluster and plot design

NAFORMA is a MS-NFI

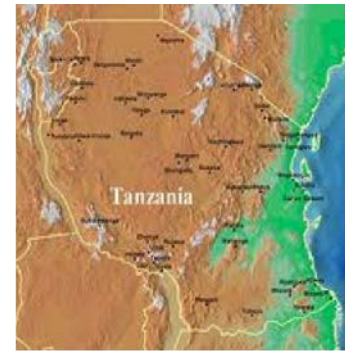
Field Data



Remote Sensing



Map Data

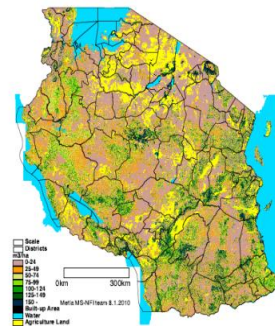


PROCESSING

Statistics



Thematic Maps



Approaches for data collection

Measurements of biophysical parameters



Local interviews



Soil data collection

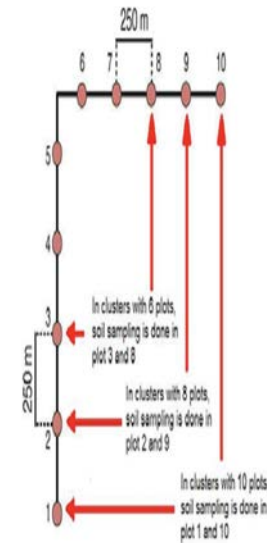


Direct observations



Soil sample collection

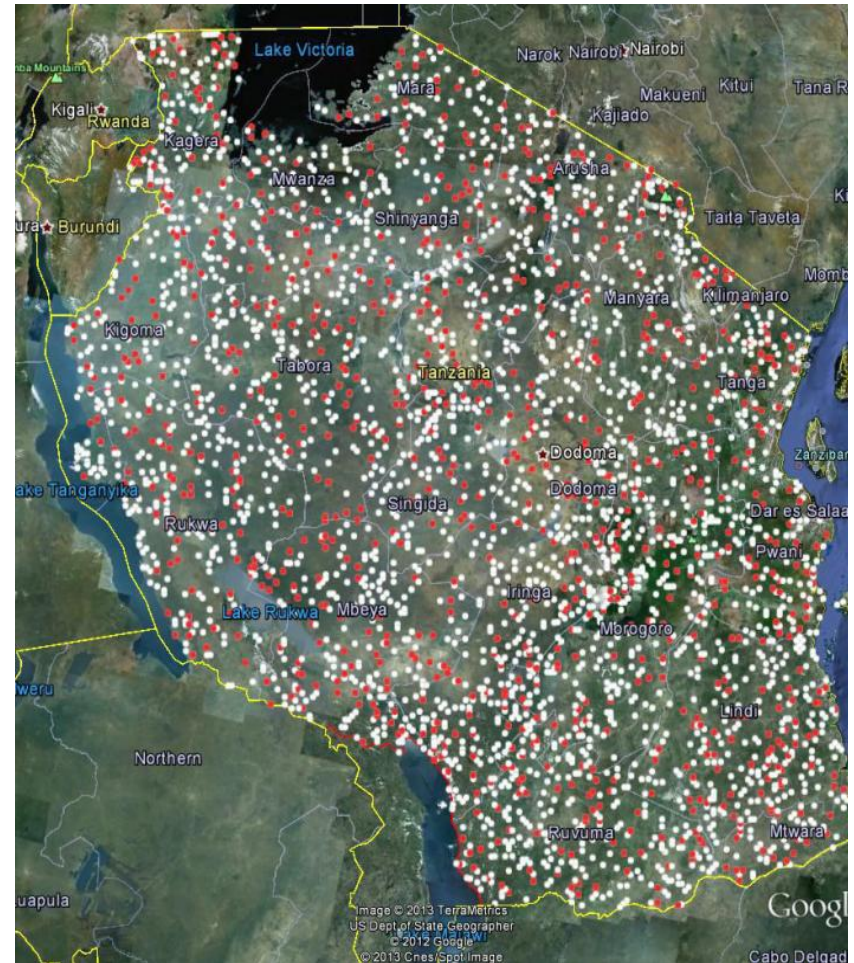
- Soil samples were collected in selected plots in all permanent sample clusters and in some temporary clusters
- In Each soil pit three soil sub-samples were collected at a depth of 10cm, 20cm and 30cm. NAFORMA did not collect data for calculation of carbon stock contained in the litter.



Plots where soil sampling was done

Achievements

- NAFORMA collected biophysical information in 30,773 plots out of 32,660 planned field plots (96%)
- 25% are PSPs;
- 4,400 soil samples
- Measures more than 240,000 trees;
- Interviewed 3,348 households and 1,118 key informants



**One of the most ambitious NFIs in Southern Hemisphere.
New tools developed – new knowledge gained.**

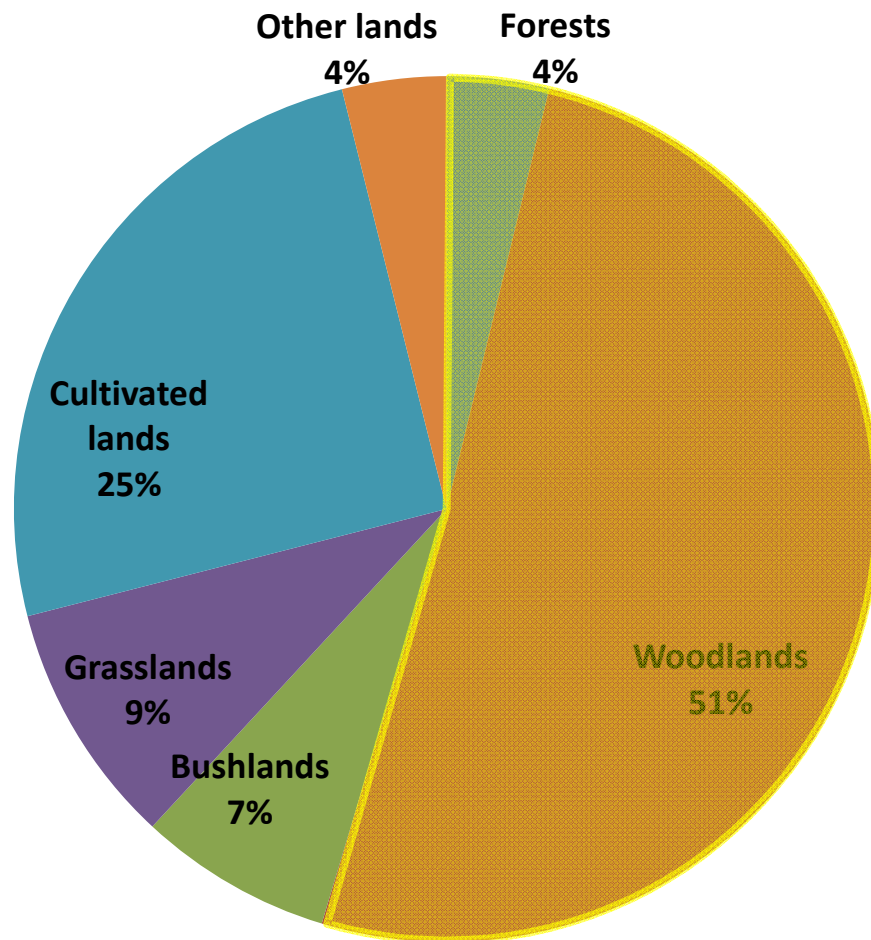
Achievement

- 214 persons (167 Tanzanian foresters & 47 FAO,)



Results

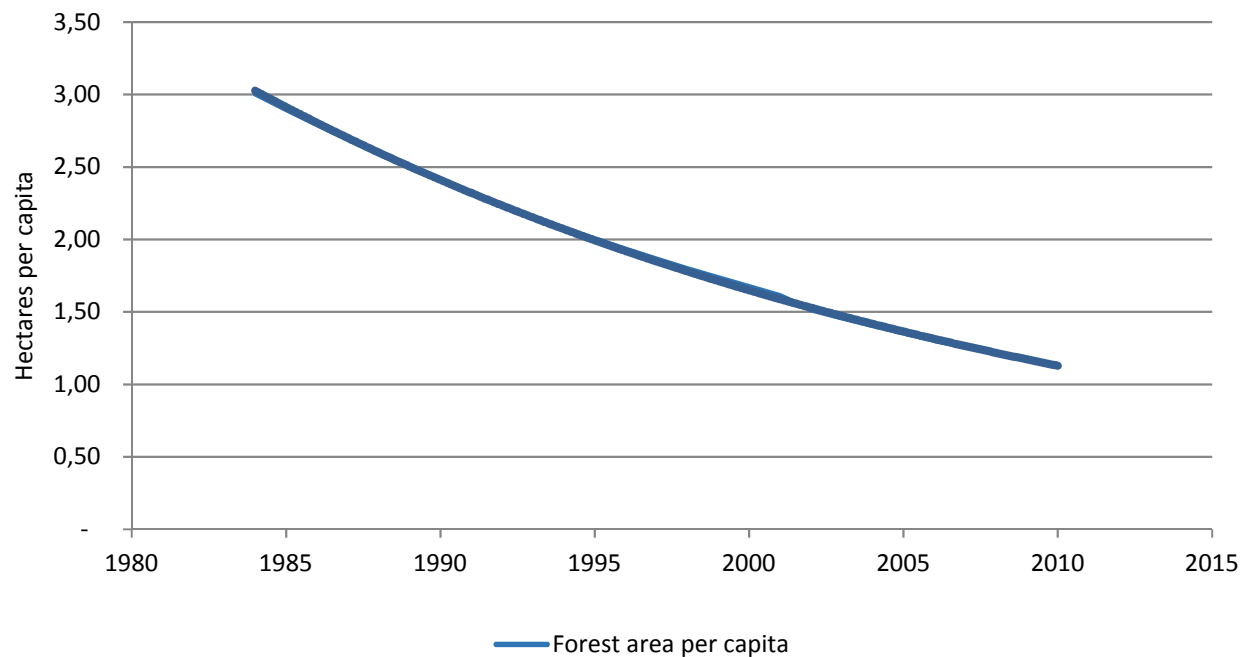
Biophysical- Land area



- 48.1m ha. (55%) of land area of Tanzania Mainland is forest and woodland.
- Woodlands occupy 44.7 million ha or 93% of the total forest area.
- The remaining 7% is made up of Humid, Coastal, Mangrove and Plantation forests.
- 42% more forest area than earlier Estimates.
- Ground based inventory provides more accurate estimates.
-

Results

Forest area per capita 1984-2010

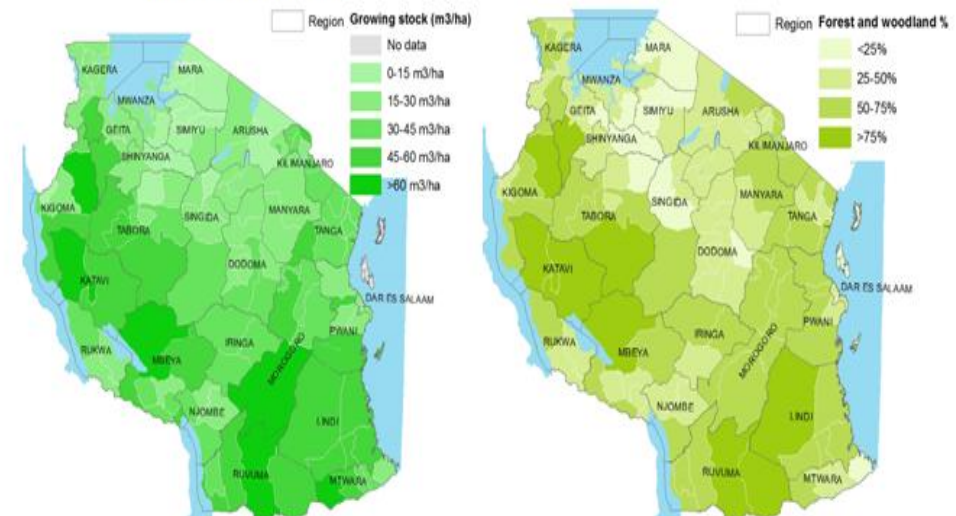


- In 1984 the forest and woodland area per capita was 3.0 ha.
- In 2012 the forest and woodland area per capita is 1.1 ha.

Volume

- Total volume of wood is 3.3 billion m³ including the volume of *Adansonia digitata* (Baobab) ,
- Baobabs constitute 147.5 million m³ or 4% of the total volume
 - The average volume of wood is 37.9 m³/ha
 - 1 m³/ha - 171 m³/ha in open grassland and Humid Montane forest respectively.
 - The standing volume of wood per capita is 74.4m³

Figure 7.1 Average Growing Stock (m³/ha) and Forest and Woodland Share of Total Area in Districts of Tanzania



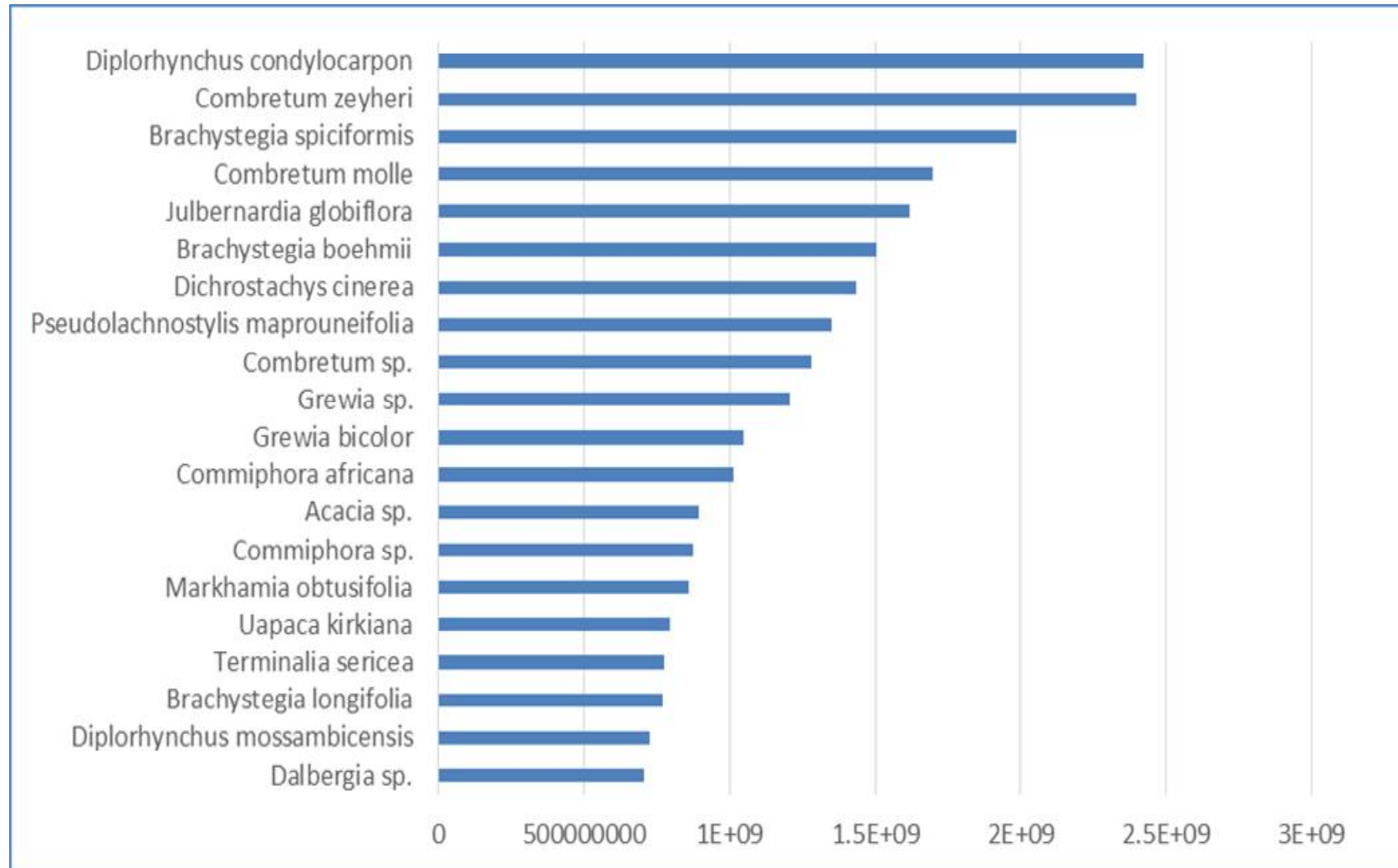
Total number of trees

- Estimated 77.2 billion trees:
 - 97 % of them are of natural origin
 - 3 % is from planted trees.
 - The average number of trees per capita is 1,723 of small dimensions and slow growth rate;



Result - 3

Twenty most common tree species – all vegetation types



Socioeconomic results

Income:

- Less than 10% of the interviewed HHs depended on forest as a principal income source.
- The primary source of income is agriculture and in some regions livestock.

Food security:

- Forests play only a minor direct role in the food security of the forest adjacent communities.
- January to March reported as critical food shortage period

Forest products:

- Firewood is the most common used forest product (96% of the households)
- Currently no affordable alternatives to source of energy
- A wide range of forest products are used by the forest adjacent communities.

User rights:

- Forest products are considered as open access resources.
- There is awareness on rules regulating harvesting for firewood, timber and charcoal making
- **But the rules are only being enforced to a very limited extent.**

Participatory Forest management (PFM):

- Generally participation in PFM activities among forest adjacent communities is low (7%)
- PFM is implemented where there is externally supported programmes.
- Village Government and NGOs are perceived to be more influential in involving communities in PFM activities
- JFM is more easily recognized by KIs also rated more successful than CBFM.

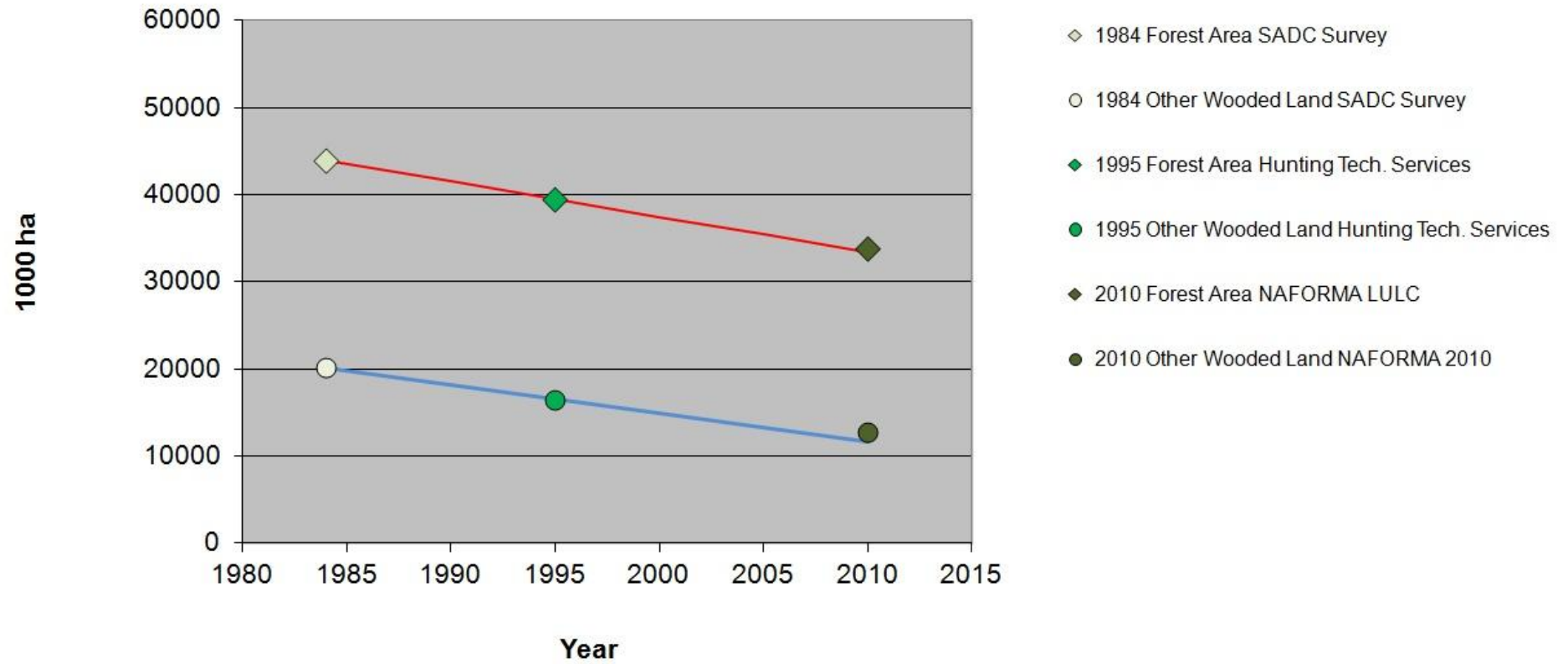
Forest Governance:

- A quarter of the interviewees experienced problems in use of land, water, forests and other natural resources.
- Village councils play a key role on the livelihood of the rural communities

Environmental services:

- There is a high degree of awareness of the multiple environmental services and benefits

Forest Cover Change



Living tree stem-wood biomass and carbon by primary vegetation type

Primary Veg Type	Volume m ³ /ha	Aboveground Stem Biomass, t/ha	Belowground Biomass, t/ha	Carbon t/ha	Carbon t	Share %
Forest	111.8	59.5	18.2	36.5	122,340,057	11.5%
Woodland	55.1	27.7	9.5	17.5	779,607,827	73.5%
Bushland	21.8	11.0	4.4	7.2	46,388,588	4.4%
Grassland	5.7	2.9	1.1	1.8	15,115,401	1.4%
Cultivated land	11.8	5.9	2.1	3.8	83,293,969	7.9%
Open land	5.7	2.9	1.1	1.9	466,006	0.0%
Water	9.2	4.6	1.7	3.0	3,429,530	0.3%
Other areas	16.8	8.4	3.1	5.4	10,192,480	1.0%
TOTAL CARBON, MAINLAND TANZANIA					1,060,833,858	100.0%

Forest and woodlands ownership

Central Govt. land	Local Govt. land	Village land	Private land	General land	Not known	No Data*	Total
Total: 16,567,224	3,097,631	21,908,274	3,505,198	2,732,575	98,389	48,994	48,0958,29
Percentage 34.5%	6.5%	45.7%	7.3%	5.7%	0.2%	0.1%	100.0%

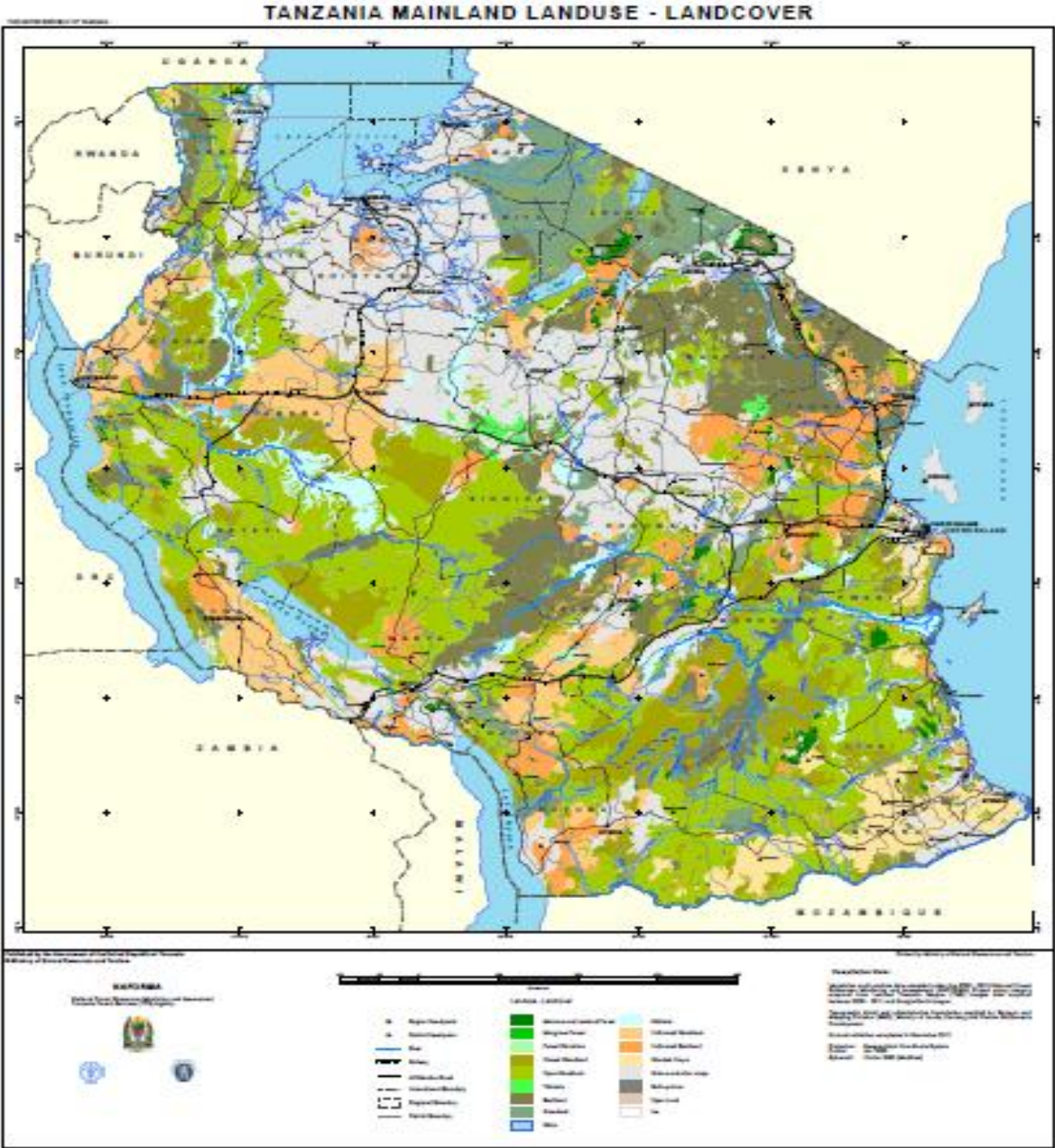
- Central Government owns about one third of the forest and woodlands
- The remain two thirds fall is under Local Government and village lands
- General land is 2,732,575 ha 5.7% of the total forest land whereas the National Forest Policy of 1998 reports the area to be 19,038,000 ha (URT, 1998).

Demand – Supply analysis of mainland Tanzania

RECENT RESEARCH FINDINGS APPLIED FOR PER CAPITA WOOD CONSUMPTION (1.39 m ³)	Unit	2013
Gross annual increment of all trees in mainland Tanzania	million m ³ /a	83.7
Domestic Supply (Annual legally available cut estimate AAC plus recoverable deadwood)	million m ³ /a	42.8
Domestic household and rural industries' <u>fuelwood</u> demand (0.96 m ³ /capita)	million m ³ /a	-43.0
Industrial and household other wood demand (0.05 m ³ /capita, FAOSTAT 2014)	million m ³ /a	-2.3
Illegal felling by subsistence farmers and traders & LULC change (-372816 ha/a); 0.38 m ³ /capita	million m ³ /a	-16.9
Import-export balance (FAOSTAT 2014)	million m ³ /a	-0.1
Wood Balance	million m ³ /a	-19.5

- Annual growth 83.7 m³
- Annual allowable cut 42.8 m³
- Consumption is 62.3 m³
- Annual deficit 19.5 m³
- This wood deficit course an annual deforestation of 372,000 ha.
- We find trees over harvested in Productive forest and Illegally harvested in protected forests

LULC



Data sharing policy

	Type of data	Rules for sharing
NAFORMA DATA	SENSITIVE DATA - As defined by National Legislation - Issues that can compromise privacy	Not shared under any circumstances
	NON- SENSITIVE DATA - Everything else in the NAFORMA socioeconomic and biophysical datasets - All NAFORMA output maps - NAFORMA metadata (detailed information about the data)	PROCESSED DATA Free public access to all processed data and pdf maps via the web portal
		RAW DATA Raw data and shapefiles of maps will be shared only with institutions and only when a written agreement exists between TFS and a collaborating institution defining the extent of data needed, the purpose of research, a publication plan, and a capacity-building component
		META DATA Free public access to all meta data

WEBSITE



NAFORMA

[Home](#)[About ▾](#)[Methodology ▾](#)[Resources ▾](#)[Publications ▾](#)[Multimedia ▾](#)

Mr. Juma S. Mgoo

Chief Executive Officer,
Tanzania Forest
Services Agency (TFS).

Welcome to **NAFORMA**

Forests and woodlands are important for many reasons: They produce the oxygen that we breathe and they ensure a steady flow of water in our rivers. They are the source of wood for construction and for energy. Forests contain high biodiversity.

We depend on the forests for a number of our daily needs. The forests are the main source of energy of the expanding population. The forests of Tanzania are therefore under severe pressure and many areas are being used unsustainably.

The National Forest Resources Monitoring and Assessment of Tanzania (NAFORMA) was conducted 2009-2014 by the Tanzania Forest Services Agency (TFS) under the Ministry of Natural Resources and Tourism (MNRT) with technical support from FAO and funding from the Finnish Government. This is the first time ever a national forest inventory has been conducted in mainland Tanzania.

NAFORMA was conducted to provide an accurate and updated picture of the condition and uses of the woody resources of mainland Tanzania. This information is needed to support decisions on promoting sustainable management of the forests of the nation. The information is important for creating awareness and transparency about the development of the forest resources.

TFS is committed to provide free and open transparent access for everyone to the findings of this first national forest inventory of Tanzania mainland. I hereby welcome you to explore the NAFORMA website, I hope you find what you are looking for. In all cases we are always open for your feedback to continue improving our information sharing.



[Open-Foris](#)



[Maps](#)

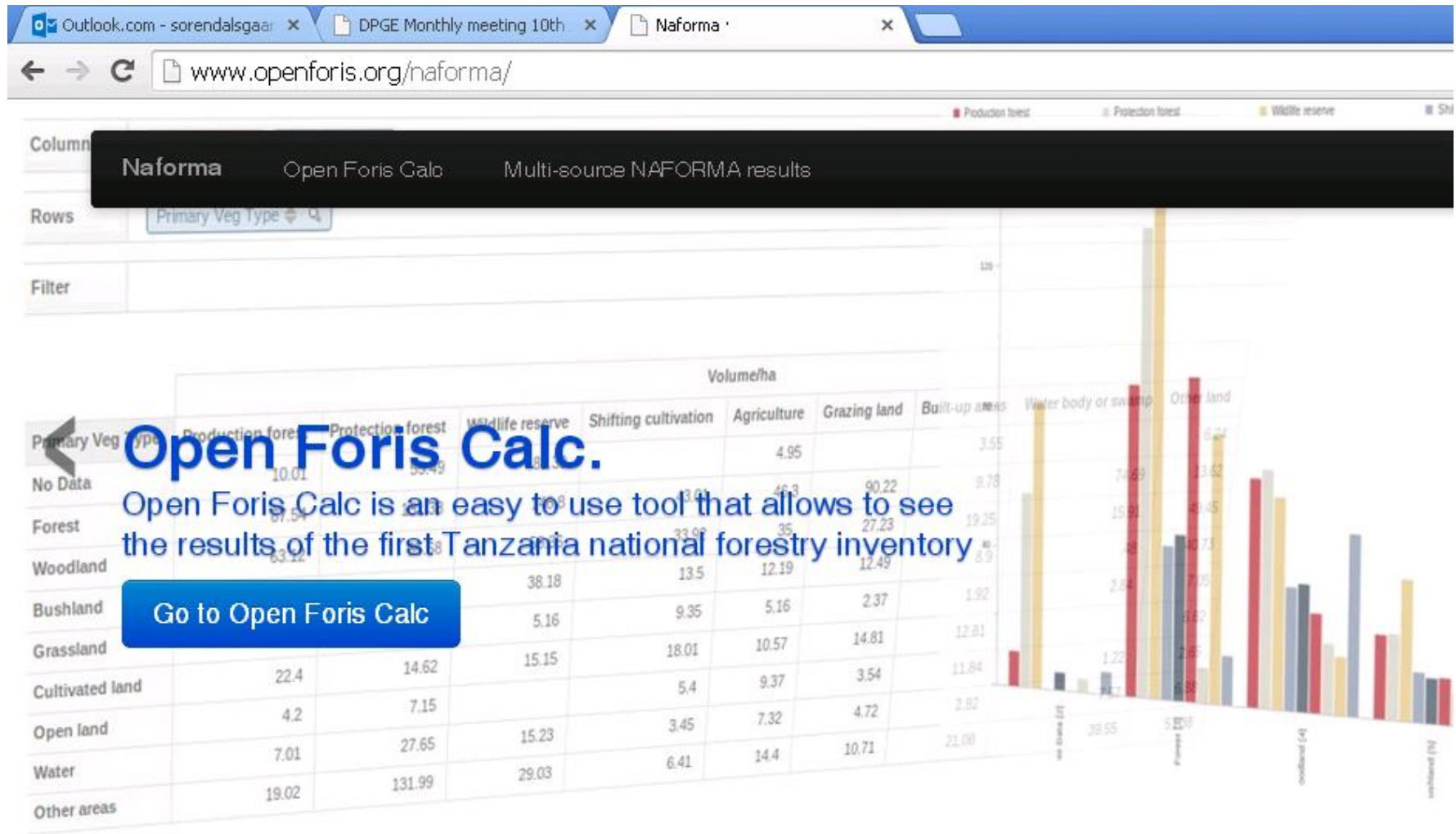


[Key Findings](#)



[Final Report](#)

Database portal



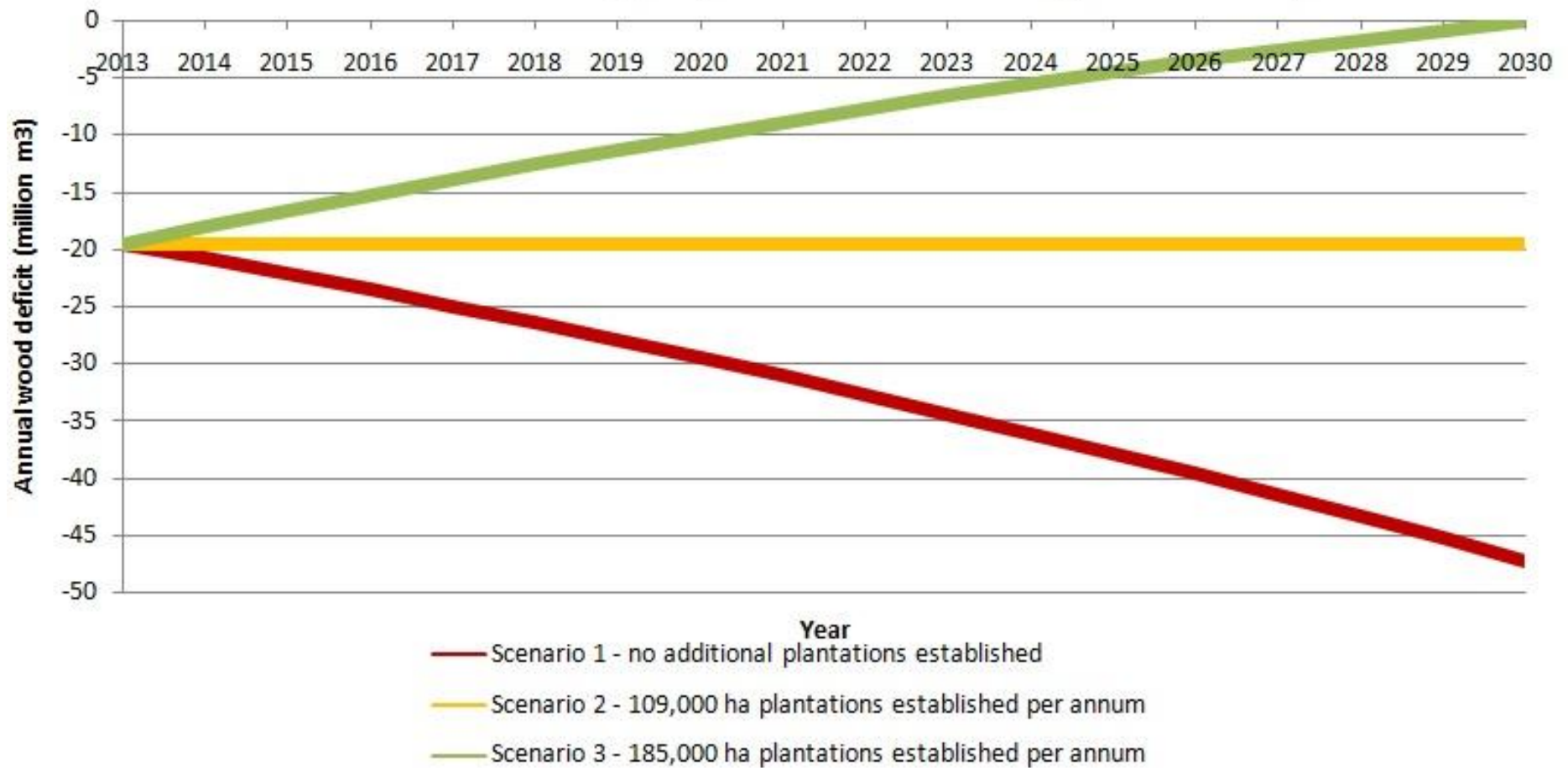
Open Foris Calc.

Open Foris Calc is an easy to use tool that allows to see the results of the first Tanzania national forestry inventory

[Go to Open Foris Calc](#)

Need for action!

Mainland Tanzania, projected wood deficit (2014 - 2030)



NAFORMA information has been used in

- Policy review
- Legal framework review
- NFP review
- Resource base development programme
- Researches
- Development of soil maps
- Development of mineral maps

Future plans

- Continue collaboration with our partners
- Continues re-measurement of PSPs
- Capacity building for our staff in data analysis and management
- Further analysis of NAFORMA data using developed methodology and models

Observed challenges



Increasing illegal tree cutting with poor governance of forest and woodland resources at all levels



Unsustainable farming practice mainly through shifting cultivations (i.e. Slash-and-burn





3/10/2016

42





3/10/2016

Tree cutting for agricultural farm expansion



3/10/2016

Impacts of wood energy on forests

45







Wildfire







Unsustainable livestock grazing in forests, woodlands and other protected areas



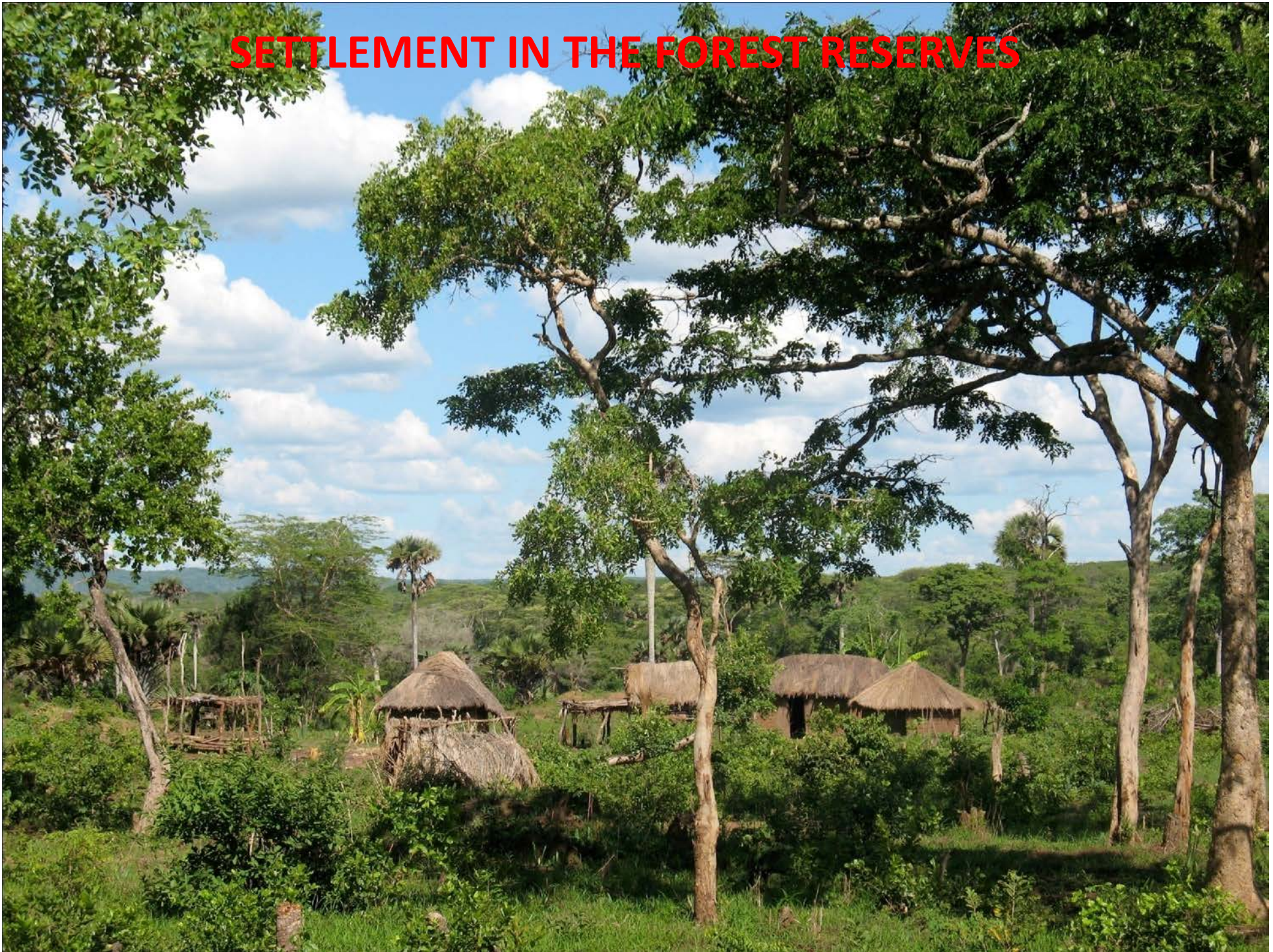


3/10/2016

53



SETTLEMENT IN THE FOREST RESERVES





SETTLEMENT IN THE MANGROVE FOREST - DSM

SETTLEMENT IN MANGROVE FORESTS



MINING IN THE NATURE RESERVE





Impacts of climate change









3/10/2016





What our forest should provides



BIODIVERSITY VALUES









Acknowledgement

All these couldn't have happened if not the support of our collaborators

- The Government of Finland
 - Provided financial support of more than 6 million USD
 - Methodology development
- FAO for the technical, logical framework and data analysis support
- National and international forest resources assessment experts
- The Government of Tanzania which provided staff, office facilities and more than 2 million USD

National Forest Resources Monitoring and Assessment (NAFORMA) of Tanzania



NAFORMA



National Forest Resources Monitoring and Assessment of Tanzania

MAIN RESULTS



Red dots Permanent sample clusters
White dots Temporary sample clusters

NAFORMA - MAIN RESULTS



MAY 2015



Thank you