Enhancing National Forest Monitoring in Tanzania for Improved Conservation and Management

BACKGROUND:

Tanzania's forests are a cornerstone of the country's ecological health, providing critical habitat for wildlife, regulating climate, and supporting the livelihoods of millions of people. The last National Forest Resources Monitoring and Assessment (NAFORMA) in Tanzania was carried out in 2009 -2014 represents a significant effort aimed at delivering extensive information regarding the nation's forest resources. NAFORMA biophysical results show that total forest area is estimated to be 48.1 million ha (Figure 1) which is 54.4% of the total land area. The total Carbon in the living trees is 1,060.8 million tons. The major carbon sink is the woodland with 73.5% of the Tanzania mainland Carbon. However, these forests face significant threats from deforestation and degradation driven by agricultural expansion, illegal logging, and charcoal production among others.

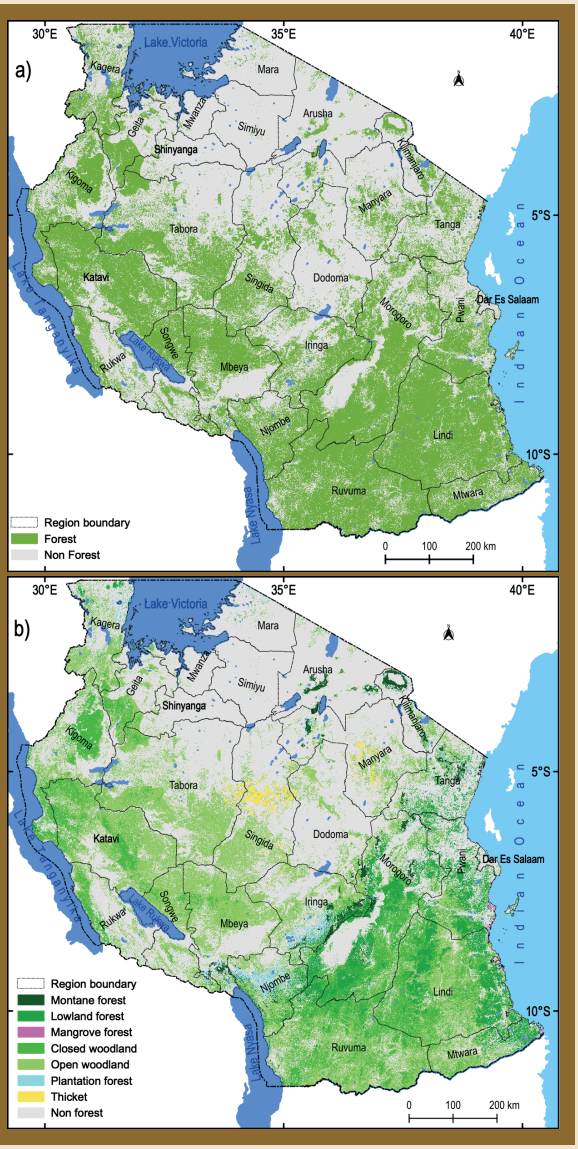


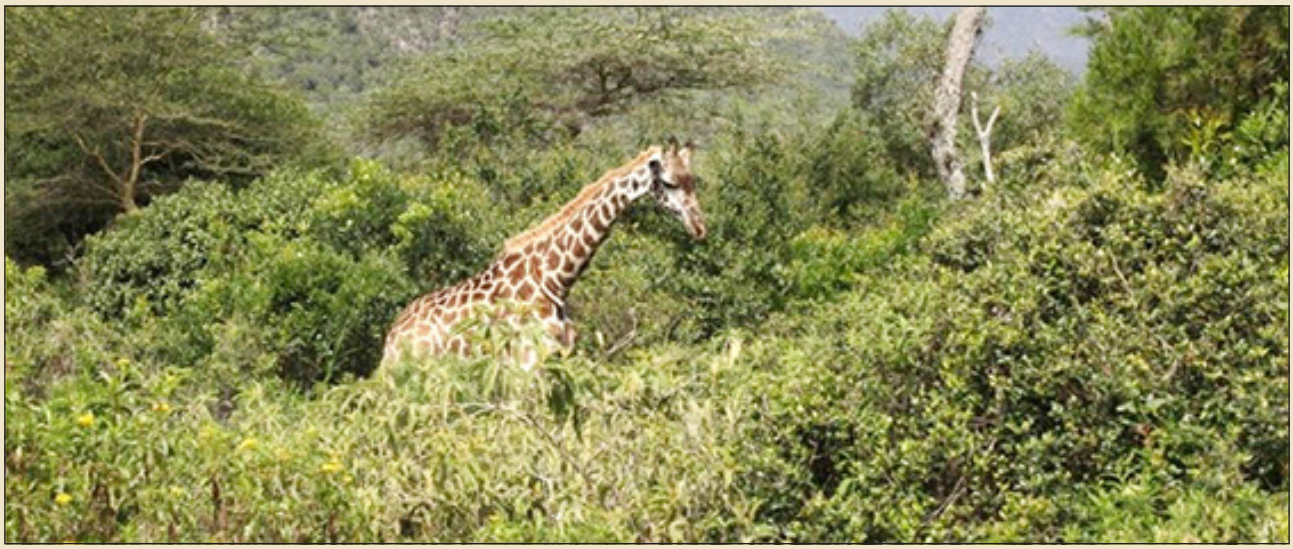
Figure 1: a) Forest extent b) Forest types distributions

USERS PROFILE:

To address the challenges of deforestation and degradation, the Tanzania Forest Services (TFS) under the Ministry of Natural Resources and Tourism (MNRT), responsible for managing National Forest and Bee Reserves on general land and tree seed sources, has partnered with the Intergovernmental Authority on Development (IGAD), IGAD Climate Prediction and Applications Centre (ICPAC), to enhance national forest monitoring efforts. This collaboration has led to significant improvements in conservation and sustainable forest management under the GMES & Africa. ICPAC is dedicated to enhancing the abilities of organizations, policy-makers, and practitioners in the design, implementation, and monitoring of regional and national environmental and natural resources policies. TFS is dedicated to advancing the sustainable management of forest resources by leveraging Earth Observation data to create pertinent operational information services. The emphasis is on assessing the status of landscapes, ecosystems, and protected areas, which includes analyzing land use and land cover changes, vegetation indices, and eco-climatic conditions that impact forest ecosystems and hence community livelihoods.

USER'S NEEDS:

TFS aims to sustainably manage the country's forest and bee resources to meet the needs of current and future generations in Tanzania. TFS is managing about **493** forest reserves and 12 bee reserves, **23** Forest Nature Reserves and **24** Plantation forests and Mangroves. The Agency proactively offers data and information regarding the state, current risks, and opportunities confronting the forest conservation status for policy and decision-making purposes. Thus, TFS require Earth Observation data to show the condition of forest reserves, forest trends, and corresponding management strategies to conserve the sustainability of these vital forest ecosystems.



INFORMATION PROVIDED:

In support of TFS, provision of status of forest extent, both Landsat 8 and Sentinel 1& 2 data were analyzed to provide forest extent and associated changes through forest cover maps. These products provided information forests and their distribution. Validation of these products has been done using both fieldwork and using high-resolution images (Google Earth images). Through the GMES&Africa, a Tropical Forest Monitoring Information System (TroFMIS) tool (http://eaforestwatch.icpac.net) has been developed to track forest degradation and changes providing necessary statistics over time on the status of the forest resources in Tanzania. The products can be obtained as pdf, geotiff in various years. These products have undergone ground verification through intense field and participatory activities to determine the accuracy of the forest information generated. In Tanzania, TroFMIS products were evaluated on the Southern highlands of Tanzania on the important ecosystem of montane forests (Figure 2).

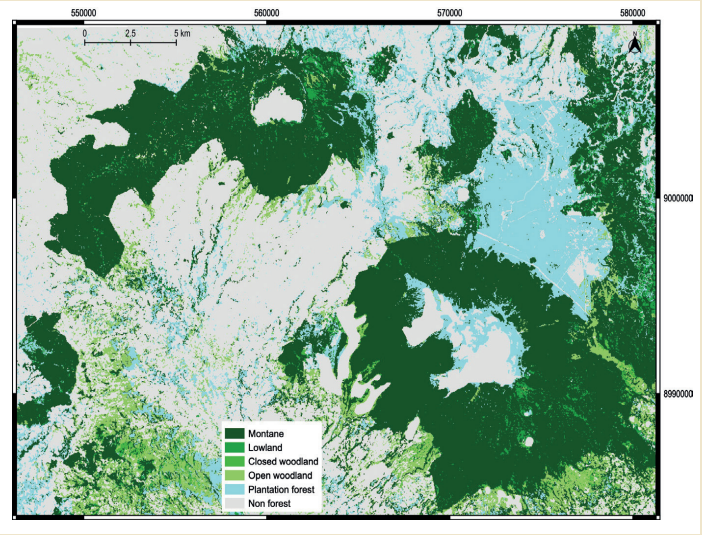


Figure 2: Example of Classification result at Mount Rungwe Nature Forest Reserve

The forest change (Figure 3) area estimates provide essential information to guide current and future conservation for sustainable forest management, especially in tropical Africa with high dependence on forest resources.

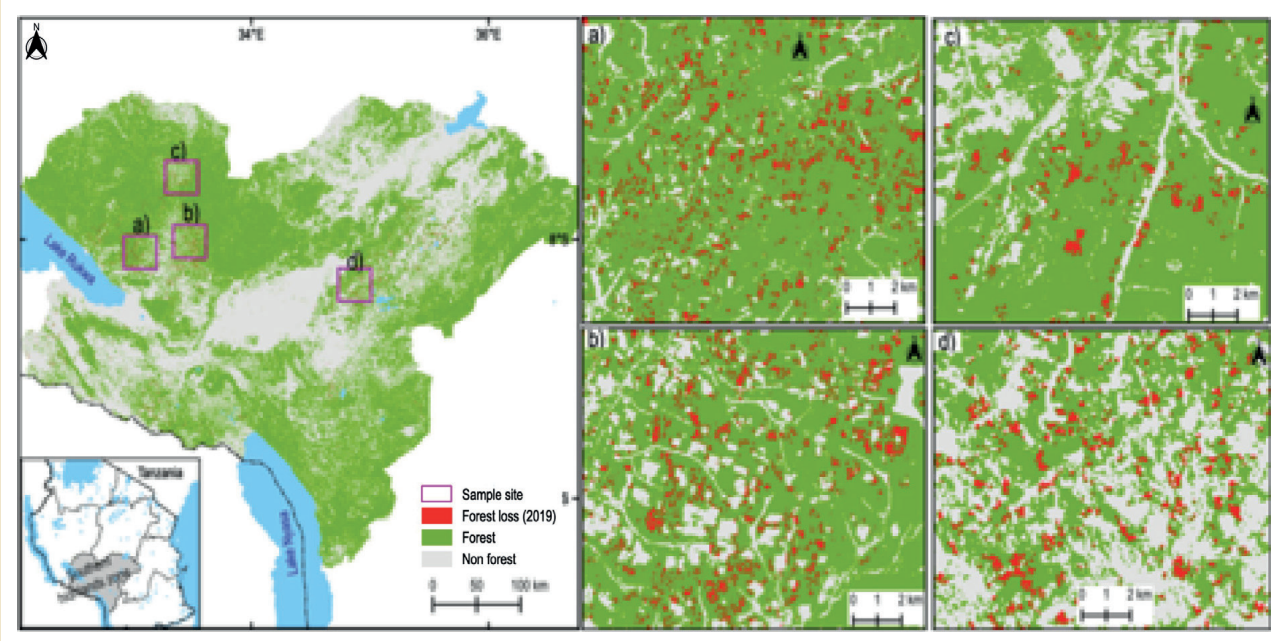


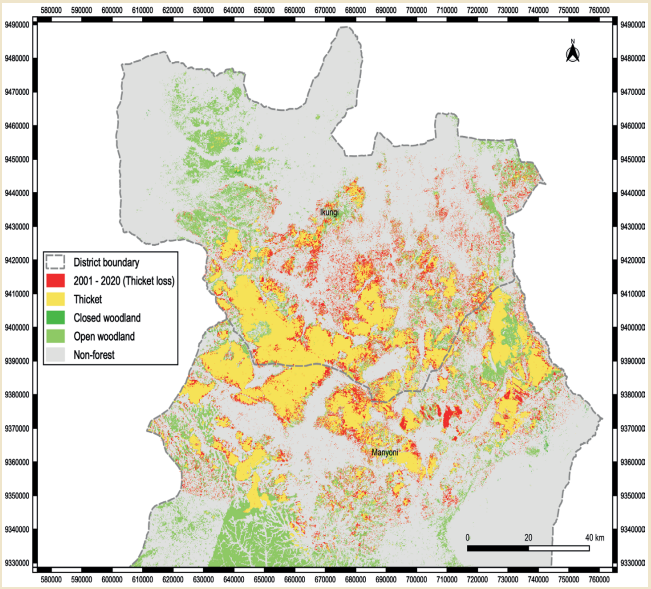
Figure 3: A map showing forest loss area for 2021 with detailed sample areas for the Southern highland of the country

USAGE:

Tanzania boasts of expansive and often inaccessible forests resources with limited information on human footprint. The accurate and timely data using satellite-based monitoring system provides precise, real-time data on forest cover changes the collaboration between ICPAC and TFS has supported in monitoring of these expansive and often inaccessible important natural forested areas further enabling the country to draw benefit from them. The status and information generated has supported informed decision-making through the availability of reliable data that enabled policymakers to make evidence-based decisions. Case in point is the characterization of thicket ecosystem that has been threatened by human activities (agricultural expansion) in Ikungi and Manyoni (Figure 4).

IMPACT:

The information provided has supported in the restoration of the ecosystem to protect the remaining areas of forest thickets. Case in point is the monitoring of Itigi thicket in Manyoni, the data has been instrumental in policy and institutional framework for sustainable thickets management. This is in addition to the number of people trained on the importance of forest monitoring and conservation.



Figiure 4: The extent of thicket deforestation in the are district of Ikungi and Manyoni for 2022

OUTREACH AND SUSTAINABILITY:

Through the ICPAC GMES&Africa several capacity building and outreach initiatives have been undertaken to support TFS staff and other institutions on the use of remote sensing technologies and Geographic Information Systems (GIS). These trainings included hands-on workshops and field exercises to build local expertise in forest monitoring and assessment, the use of high-resolution satellite imagery and predictive analytics to detect deforestation hotspots and monitor forest health. In this regard, the partnership between TFS and ICPAC has transformed national forest monitoring in Tanzania, leading to improved conservation and sustainable management of forest resources in efforts to combat deforestation and forest degradation.