

## 4. Conclusions and outlook

Safeguards and associated multiple benefits need to be considered explicitly in all stages of national planning for REDD+. Tanzania has completed the initial steps of drafting a REDD+ Strategy, Action Plan and national REDD+ safeguards. The REDD+ Strategy sets an ambition for REDD+ to achieve multiple benefits, and makes provisions for a safeguards information system that includes spatial data to be included in the country's MRV system. The REDD+ Action Plan includes an activity to develop methods for REDD+ co-benefits mapping, to which this report makes a major contribution. The draft national REDD+ safeguards document affirms that REDD+ activities are [to be] designed to maintain and enhance biodiversity, ecosystem services and to meet forest dependent community needs, and that possible impacts on biodiversity and other ecosystem services are [to be] analyzed when considering options for REDD+ actions.

The maps and analyses in this report aim to support decisions on where REDD+ can be undertaken, and identification of potential actions for achieving multiple benefits from REDD+. They provide spatial information that can be used to facilitate consideration of the environmental components of Tanzania's draft REDD+ safeguards. Box 2 provides examples of how the different maps developed link to specific safeguards criteria.

The maps in this report can help to identify how biodiversity and ecosystem services relate spatially to drivers of deforestation, as well as to current land-use designations. The maps could also be used in other land-use planning processes at the national scale. Together with additional relevant information, they can support discussions and decision making in an integrated sectoral planning process, including for monitoring and evaluation of land-use planning, as called for in the REDD+ Action Plan.

Some of the spatial information presented here could also be used as input to defining indicators in a safeguards monitoring plan for Tanzania. Guidelines for the development of such a monitoring plan are outlined in Annex 4 of the draft REDD+ safeguards document (June 2013). The guidelines state that a monitoring plan will be prepared, which will define: the specific information to be collected; where such information can be found; how it will be gathered and analyzed; and who will be responsible. Furthermore, the guidelines state that a facilitation team and a standards committee should agree on which indicators should be assessed at a particular assessment period. The facilitation team and a consultant should try as much as possible to collect primary data provided this

**Safeguards Criterion 7.1:** The REDD+ initiative analyses the possible impacts on biodiversity and other ecosystem services when considering options for REDD+ actions, and:

**Safeguards Criterion 7.2:** The REDD+ initiative maintains and enhances the conservation of biodiversity and other ecosystem services and considering the needs of forest dependent communities and appropriate management and utilization methods.

**Maps 6-10 illustrate areas of high species diversity, including threatened species, and wildlife corridors that constitute key habitat for biodiversity. Maps 19-23 and associated text illustrate example decision processes for allocating areas for REDD+ interventions, and discusses how biodiversity and ecosystem services can be considered in the process.**

**Safeguards Criterion 7.3:** The REDD+ program protects natural forests from degradation and conversion to other land uses including forest plantations.

**Map 5 shows the distribution of natural forest in Tanzania according to two relevant definitions of natural forest.**

**Safeguards Criterion 7.4:** The REDD+ Program ensures restoration of degraded areas using indigenous species.

**Map 22 and associated text discusses the process of forest rehabilitation.**

**Box 2: Examples of maps which link to specific safeguards criteria in Tanzania's draft REDD+ safeguards document**

can be done properly and effectively. Where reliable sources already exist, these should be used in the interests of cost effectiveness. The facilitation team should prepare a draft report of the performance of the REDD+ programme for each of the indicators in the REDD+ safeguards.

The maps in this report can contribute to this process by helping in the identification of priority aspects of environmental multiple benefits and safeguards, which can be discussed in the context of possible REDD+ actions. For example, wildlife corridors and threatened species are mapped in this report. Tanzania may find it important to monitor the impact of REDD+ activities on these wildlife corridors and threatened species, in addition to using their current spatial distribution to inform the location of REDD+ actions. The way in which REDD+ actions are implemented will have a great impact on the results, but identifying what benefits REDD+ could generate, and what risks need to be mitigated, is also an important initial step.

The maps in this report largely build on NAFORMA products, bringing in other datasets as necessary to provide a more comprehensive picture. The land-use land-cover map makes it possible to understand the likely distribution of natural forest, which is essential

for effective application of the REDD+ safeguards. NAFORMA's woody biomass map improves previous knowledge of carbon stocks in Tanzania. The NAFORMA biophysical field inventory provides information on the distribution of tree species in Tanzania, the types and distribution of human impacts on forest, and the potential for non-timber forest products. The socioeconomic survey provides information on people's use of forest products. These parameters can all be used in REDD+ planning to help ensure that REDD+ actions contribute to multiple benefits, and consider social and environmental risks, as outlined in Tanzania's draft REDD+ Safeguards document.

A number of additional maps and analyses could further improve the data available for REDD+ planning and monitoring in Tanzania. For example, themes not addressed in this document include key areas of **agricultural expansion** (including for **biofuels**), and other competing land uses. Mapping such areas would help expand the picture of current land uses and land-use plans in Tanzania, and inform the potential for REDD+ actions to complement developments in sectors other than forestry. The REDD+ Action Plan specifies strategic activities such as supporting **agricultural practices** that promote soil fertility, productivity and crop protection (**conservation agriculture**), and documenting and promoting existing best **agro-forestry** practices. It would be useful to explore further where such activities could appropriately be implemented. Similarly, it would be helpful to identify appropriate locations for the establishment of **woodlots and plantations**, potentially important for addressing some of drivers of deforestation and forest degradation in Tanzania, such as the high and growing demand for biomass based fuels.

Access to comprehensive maps showing the **locations of current sites for Community Based Forest Management (CBFM), Joint Forest Management (JFM) and village forest reserves** would be particularly

useful for REDD+ planning, since such maps would allow for an understanding of which forest areas on village land have a management plan already, and which areas are still unregulated and suffering from insecure land tenure. One output in the REDD+ Action Plan concerns a database on ownership of forest related rights. Maps 13 and 21 show the location of wards that have PFM and CBFM activities, but more detailed spatial data on what forests are covered under management plans are not yet available.

Maps of alien and invasive species would also be useful in REDD+ planning, as these are among the drivers identified in the REDD+ Action Plan. In the case of invasive tree species, the NAFORMA data could be used to assess their current distribution, as a basis for developing a monitoring plan and for designing policies and actions to control them. Complementing data sources would be needed for other invasive species.

Furthermore, the REDD+ Strategy and Action Plan mention the need to support the development of a **livestock** strategy in the context of REDD+. Strategic interventions include implementation of effective plans for sustainable management of forest that enhance forage productivity under different forest management regimes. Specific actions include promotion of silvi-pastoral technology, implementation of rotational grazing, and dry season fodder production on private, communal and general lands. Further mapping exercises could look into potential zones for implementing such actions.

The maps in this report are intended for national level planning. Maps with the same or similar themes can be developed for sub-national planning, using appropriate data. Furthermore, subject to availability of appropriate input data, more sophisticated analyses could be undertaken using modelling or spatial planning software to estimate the carbon and co-benefits objectives that can be achieved by a proposed set of REDD+ actions.



# Annex I

## What can NAFORMA survey results say about tree biodiversity in Tanzania?

The NAFORMA inventory is one of the biggest efforts made by any developing country to map its forest resources. It comprised over 32 000, 15m-radius plots grouped into L-shaped clusters of between 6 and 10 plots. The survey was designed to provide an assessment of the country's forest resources (extent, composition, condition, uses and other socioeconomic parameters). The carbon stocks can be easily derived from the NAFORMA results.

The NAFORMA survey recorded 1 229 species, which includes 67% of the species listed in the NAFORMA species checklist (983 species) and an additional 246 species not contained within this original expected species list. A total of 33% of the species on the checklist were not found in the plots. In addition, 89 taxa were recorded but only identified to genus level. Of these 89, 31 were not on the original check list.

The NAFORMA species checklist will be revised to reflect the latest knowledge, including the findings of the inventory, which will involve adding the 246 species and 31 genera. Tanzania is a biodiverse country so the plot sampling area of just over 700 m<sup>2</sup> for each plot may not have picked up all species present within the area around the sample site, especially in the more species-rich forest types.

Within each NAFORMA plot, the vegetation type was recorded. It is therefore possible to investigate how the species richness of NAFORMA plots varies between different types of vegetation. Results show that the total number of species recorded in a vegetation type increased with the number of plots surveyed for that vegetation type (Fig. 2). For all vegetation types, additional species continued to be found in new plots; showing that NAFORMA sampling was insufficient to record total species richness. This is particularly true for humid and lowland forests, and helps explain why fewer species were recorded in the NAFORMA inventory from lowland and humid montane forest than from open and closed woodland, where there was a lot more sampling and better sampling of overall diversity.

An alternative way of assessing the relative species richness of the different vegetation types uses the average number of species found per plot in each of the vegetation types (Fig. 2). The average number of

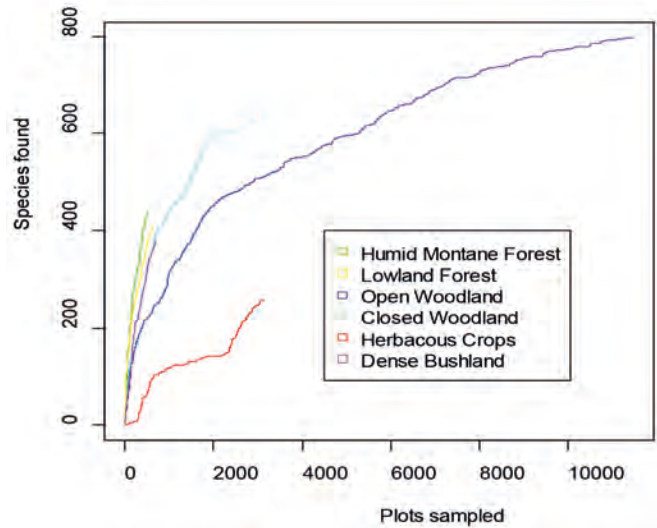


Figure 1: Cumulative number of species found in selected vegetation types as more plots were sampled. If this curve flattened out it would indicate that the survey has recorded most of the richness in that vegetation type. As the figure shows, the curve of the humid montane forest is the steepest, showing that if more plots were sampled, many more species would have been found.

species per plot varied between vegetation types, with more species being found in forested and wooded plots than cultivated ones. However, since the NAFORMA inventory does not fully register the tree species richness pattern in most vegetation types (Fig. 2), it is not possible to simply extrapolate from the average plot richness to the total richness of the vegetation types. It should also be noted that the number of species identified in a plot may have been influenced by differences in the difficulty of species identification between vegetation types, and differences in the familiarity of the field workers with the species (some rare species may be mistaken for more common ones, for example<sup>11</sup>). The relative distribution of local-level, plot-scale, tree species richness is presented in Map 6, which shows that the highest localised tree species richness were in areas of forested and wooded land.

The NAFORMA data also contains information on species of particular conservation importance including: species that are a) only found in (endemic to) the Eastern Arc Mountains of Tanzania or b) threatened with extinction according to the Eastern Africa Plant Red List Authority. Of the 52 tree species listed as endemic to the Eastern Arc Mountains (Burgess et al 2007), 8 were identified within the Eastern Arc area (in 1 639 NAFORMA inventory plots covering 116 ha across 264 clusters). Interestingly, 11 of the 52 Eastern Arc endemic species were picked up within the NAFORMA survey outside of the Eastern Arc area; suggesting that either some of these

<sup>11</sup> Ahrends, A., Rahbek, C., Bulling, M. T., Burgess, N. D., Platts, P. J., Lovett, J. C., Marshall, A. R. (2011). Conservation and the botanist effect. *Biological Conservation*, 144(1), 131–140.

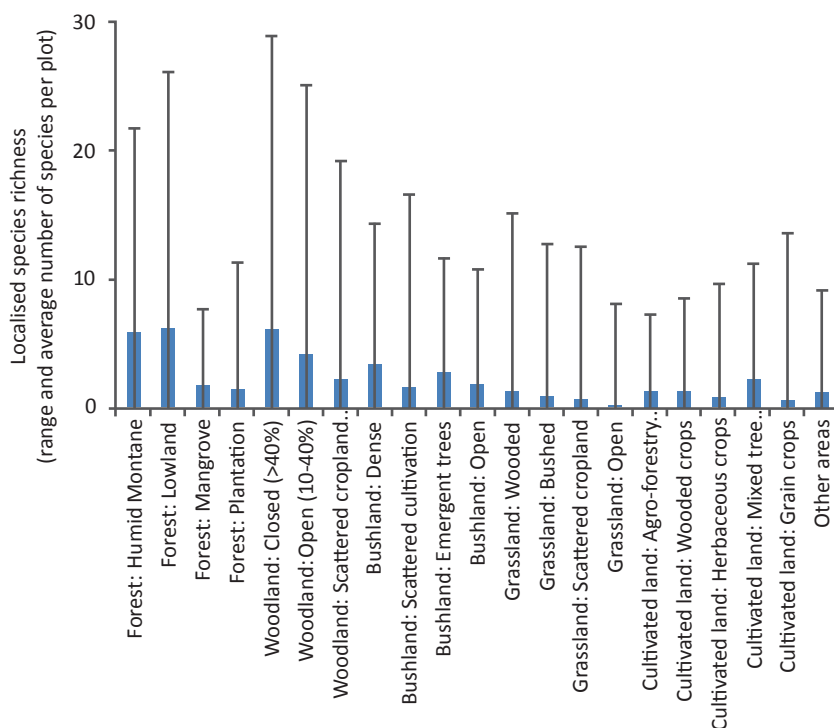


Figure 2: The average (mean) number of species found per plot for each of the vegetation types (blue bars), with the range in number of species shown as black lines.

species of conservation importance may have a wider distribution that was previously thought, or that the NAFORMA identifications need to be reassessed. Recent updated assessments of confirmed specimens suggest that three of the species are not strict endemics to the Eastern Arc; two occur in coastal areas and one in remote forest near northern part of Lake Tanganyika (Roy Gereau, pers. comm.).

In terms of threatened species, the NAFORMA inventory recorded 38 of 394 Tanzanian species listed as threatened by the Eastern Africa Plant Red List Authority (EAPRLA via Roy Gereau, pers. comm.). The humid montane forests had a particularly high number of threatened tree species (20) given the number of plots sampled (Table 2). Map 7 shows the location of clusters containing threatened tree species highlighting that they were mostly recorded within forest habitats, including humid montane forest.

Vegetation cover	Number of threatened species recorded	Number of plots surveyed
Forest: Humid Montane	20	585
Forest: Lowland	13	868
Forest: Mangrove	0	119
Forest: Plantation	1	299
Woodland: Closed (>40%)	13	3 544
Woodland: Open (10-40%)	21	11 489
Woodland: Scattered cropland (unspecified density)	2	814
Bushland: Dense	8	831
Bushland: Scattered cultivation	1	480
Bushland: Open	6	1 159
Grassland: Wooded	4	1 662
Grassland: Scattered cropland	0	234
Grassland: Open	0	1 068
Cultivated land: Wooded crops	1	669
Cultivated land: Herbaceous crops	5	1 932
Cultivated land: Mixed tree cropping	3	81
Cultivated land: Grain crops	2	3 389
Other areas	4	720



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REDD+ has the potential to contribute to achieving more policy goals than climate mitigation alone. In Tanzania, REDD+ is expected to deliver multiple benefits, whose nature and extent will depend on the location and type of REDD+ activity implemented. These benefits include sustainable use of forest resources, biodiversity conservation, poverty alleviation, maintenance of forest dependent communities' rights, and improved community livelihoods. The REDD+ safeguards agreed under the United Nations Framework Convention on Climate Change are intended to guide REDD+ implementation to avoid adverse effects to people and the environment, and to ensure multiple benefits.

During the last years, the Tanzanian Forest Service has produced a unique set of forest, socioeconomic and governance related data and maps from 32 000 field inventory plots and interviews with 3500 households and 1100 key informants, which among other sources of data have been used for the production of analysis and maps in this publication.

Maps can help to increase understanding of the spatial distribution of such potential benefits, and support decision-making on where and how REDD+ might be implemented. The maps presented in this brochure were developed to support Tanzania's implementation of the REDD+ safeguards, and planning for multiple benefits from REDD+. Themes include natural forest, biodiversity, ecosystem services, drivers of deforestation and forest degradation, and potential zones for implementation of REDD+ activities.

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