Estimating the costs of REDD+ in Tanzania

Policy Brief

April 2012

Introduction and background

The Government of the United Republic of Tanzania – together with national and international NGOs, and supported by a range of development partners – is currently preparing a national programme of Reduced Emissions from Deforestation and Forest Degradation (REDD)[1]. As part of the preparation activities, a study was commissioned by the UN-REDD Programme to identify the combined costs of REDD+ at both project and national levels. This briefing note presents the findings and conclusions of the study.

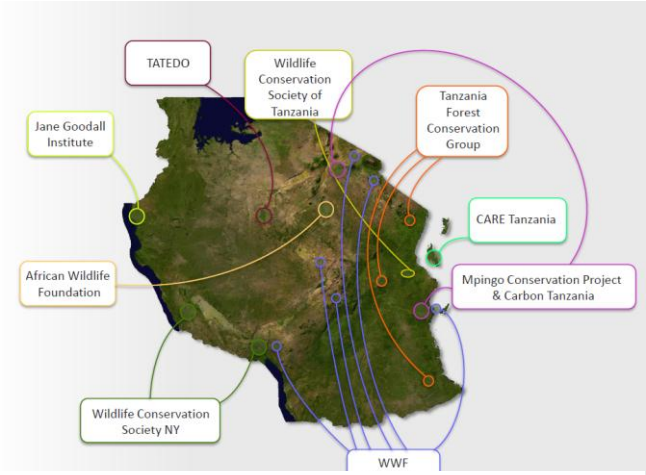

Figure 1: REDD+ Pilot Projects in Tanzania

[1] REDD is also being implemented to provide additional co-benefits such as conservation of biodiversity and sustainable forest management. Consequently, the acronym "REDD" has been extended to "REDD+"

The objectives of the study were to:

- understand and quantify the drivers of deforestation and forest degradation;
- understand the costs of REDD+ implementation at project and national levels

Data for this study was compiled from a number of sources including the budgets and expenditures of selected REDD+ pilot projects (see Figure 1) as well as government agencies. It was supplemented with data gathered in the field with project developers on various land-use options (corresponding to identified deforestation drivers such as slash-and-burn agriculture, illegal charcoal and timber harvesting). These costs were then fed into an MS Excel-based analysis tool, which in turn was linked to a software visualization tool called "REDD Abacus".

The findings and conclusions presented in the policy note must be treated with some level of caution. They are based on field examples from a limited number of sites in the country, representing approximately 328,000 hectares; the data provided was of variable quality. Financial figures presented as implementation and institutional costs were partially drawn from government and NGO project budgets, rather than from actual costs of implementation. Finally, the study only considered above and below-ground woody

biomass but does not include soil carbon stocks, which are known to be considerable in dry forest ecosystems of the type found in Tanzania (e.g. *miombo* woodlands). This is because soil carbon stocks are still subject to international negotiations and have yet to be included in any future agreement on REDD+.

What are REDD+ costs?

The cost elements of REDD+ can normally be grouped into four general categories:

i. Opportunity costs. These are equivalent to benefits foregone by government, farmers and local communities in conserving forests, rather than adopting potentially more profitable alternative land uses, such as agriculture, or harvesting for timber and charcoal. REDD+ opportunity costs are the difference in net earnings from conserving or enhancing forests versus earnings from converting them to alternative land uses.

ii. Implementation costs. These are costs relating to activities that address drivers of deforestation and reduce leakage. In the context of pilot projects, these are costs associated with mobilising and sustaining a project team, financing project investments, operations and management.

iii. Transaction costs. These are costs related to the measurement, reporting and verification of carbon benefits and related benefit sharing agreements.

iv. Institutional costs. These are costs incurred at the political-administrative level to develop, manage and enforce REDD+. They are costs incurred by government to ensure a positive legal and policy environment, to address governance and to reduce unregulated / illegal forest use.

Why are opportunity costs important in the context of REDD+?

If a REDD+ project – or national REDD+ strategy – limits livelihood activities (whether they are legal or not), then opportunity costs will arise. If these costs are not compensated, then either forests will continue to be degraded, or alternatively, communities and households will face negative impacts in terms of lost income opportunities.

Opportunity costs can provide project planners and government agencies insights into the

Box 1: The "true" value of forest in Tanzania

The estimation of opportunity costs only partly reveals the macro-economic value of forests in Tanzania – it is important to also recognize that non-monetized forest values, such as biodiversity, water supply and soil conservation constitute significant benefits to the economy, the nation and the world as a whole.

In 2003, the Forestry and Beekeeping Division conducted an economic analysis of the Catchment Forest Reserves in Tanzania, by monetizing a full set of forest benefits accrued from these forest areas. The results show a significantly higher economic value of natural forests than the results of the opportunity costs analysis in the present study. The average actual Total Economic Value (TEV) established added up to a total of 17,250 US$/ha.

relative scale of deforestation drivers; it helps identify which groups of people might be most affected by REDD+ activities and helps determine what level of compensation would be required to provide a fair deal to forest users.

It is important to recognize that REDD+ opportunity costs only provide an indication of the economic value of forests and do not take into account all the other values that forests have, such as biodiversity, water catchment and so on (see Box 1), unless they have been economically valued and the market for these products exists.

Opportunity cost curves

An opportunity cost curve provides a comparison of the opportunity costs of different types of land use change. Figure 2 below presents this information from the three pilot projects used in this study, covering a total of around 328,000 hectares of woodland and forests in western, central and southern Tanzania over a ten-year period. The vertical axis represents the opportunity cost of the emissions reduction option (in monetary units per tonne of CO_2 equivalent), while the horizontal axis shows the corresponding quantity of reduction (expressed in million tonnes of CO2 equivalent per year). A wide bar indicates significant potential emission reductions, while a narrow bar indicates the opposite.

The graph indicates that the Jane Goodall Institute (JGI) site in Kigoma has two land use options that can be avoided at relatively low cost (fuelwood collection and cattle grazing) and two that will generate higher opportunity costs if emissions are to be avoided (unsustainable timber and shifting cultivation). Although low in cost, the fuelwood and cattle grazing options actually reduce relatively few emissions as

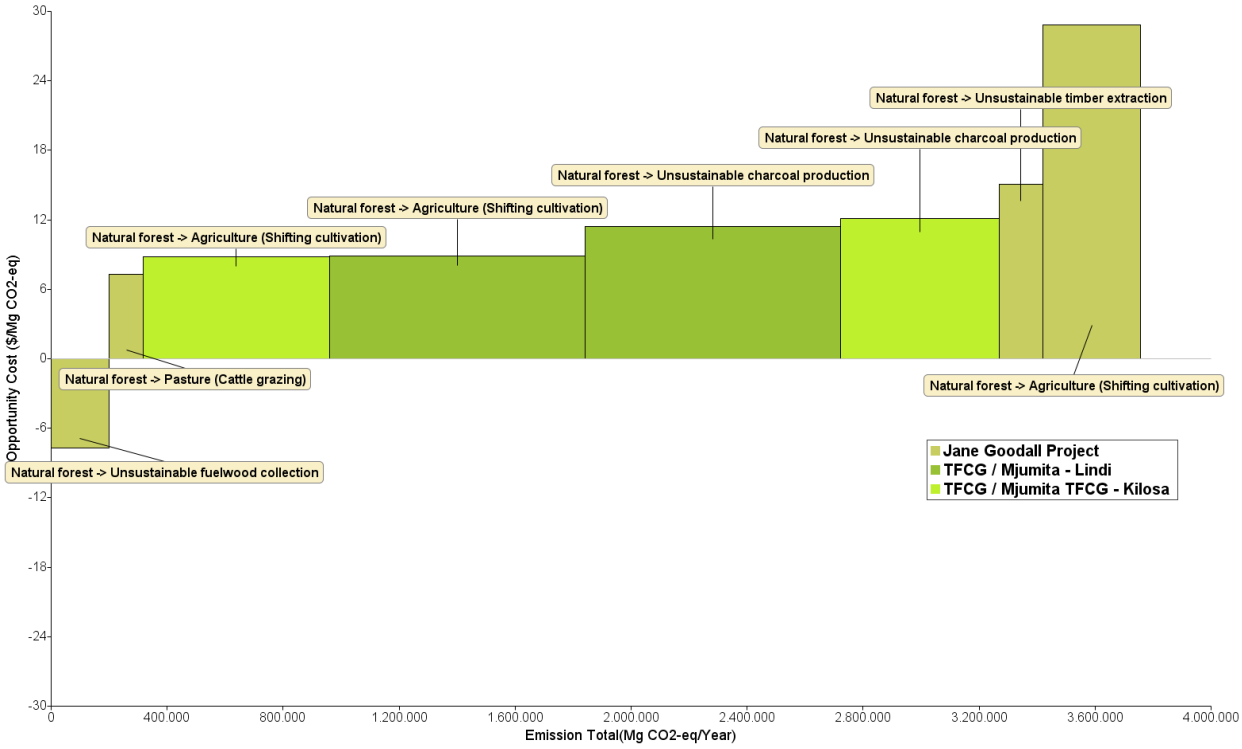

Figure 2: Opportunity cost curve for three pilot projects

Overall, the opportunity cost curve shows us that the costs of reducing forest emissions vary considerably from site to site, even when it refers to similar land use changes.

represented by the narrowness of these bars.

Avoiding land-use changes – i.e. shifting cultivation and unsustainable charcoal) – in Lindi and Kilosa (in the Tanzania Forest Conservation Group MJUMITA project area) generates opportunity costs of between 9 and 12 $US/tonne and has the potential to generate significant levels of emission reductions (as seen by the width of the bars for these two sites).

One of the land-use options – unsustainable firewood collection in Kigoma – has a *negative* opportunity cost. This means, in effect, that converting natural forest to this land use generates costs, rather than benefits. The implications of this are that reducing unsustainable firewood collection in this region generates net earnings rather than costs.

Overall, the opportunity cost curve shows us that the costs of reducing forest emissions vary considerably from site to site, even when it refers to similar land use changes.

Linking costs of REDD+ to opportunity costs

In addition to opportunity costs at the site level, the study provided estimates of the other components of combined REDD+ costs – namely, implementation, transaction and institutional costs (referred to as combined costs of REDD+).

Participatory Forest Management (PFM) is a core aspect of the national REDD+ strategy and being strongly promoted by pilot projects. Interestingly, the findings suggest that there are no significant differences in costs of a PFM process facilitated by district authorities when compared to a similar process facilitated by an NGO.

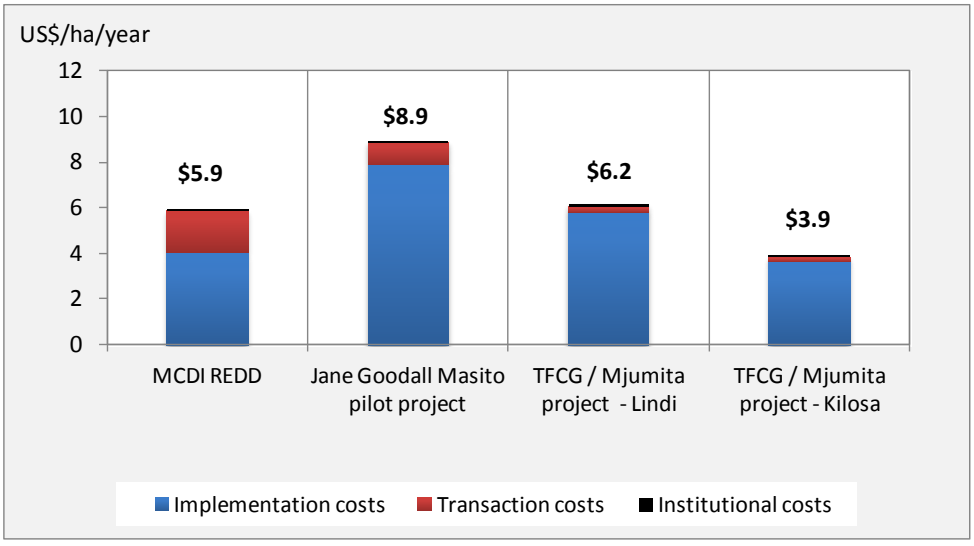

Figure 3: Average annual project costs per hectare

Implementation costs experienced by pilot projects increase dramatically when the costs of introducing PFM are combined with additional costs of supporting a broader process of rural development – for example, through sustainable agricultural intensification and reducing demands for charcoal. This

combination of PFM plus integrated rural development is likely to be a common characteristic of REDD+ projects in Tanzania.

With regard to institutional costs, the costs of effective forest management, as estimated by Tanzania Forest Service is US$ 8.3/hectare, but budget constraints mean that current expenditure is around US$ 2.3/hectare. This compares with US$ 7.7/hectare, being the actual revenue spent by the Tanzania National Parks Authority to manage forest areas under their jurisdiction. The estimate of recurrent forest management costs by communities for areas under PFM is US$ 2.3/hectare – just over a quarter of the estimated costs of effective management defined by Tanzania Forest Service.

Institutional costs are the lowest per hectare costs of all the REDD+ cost elements and in most cases are shared across many project sites.

The findings indicate significant differences between projects in terms of the combined costs of avoiding carbon emissions. The Mpingo Conservation and Development Initiative (MCDI) REDD+ project has the lowest combined cost (US$5.9/ha/yr) while the JGI project has the highest REDD+ costs at US$ 8.9/ha/yr) (Figure 3).

Care must be taken when comparing these costs and drawing conclusions regarding the relative costs of different NGO-implemented projects. The JGI and Tanzania Forest Conservation Group (TFCG) pilot projects address a range of deforestation drivers – including supporting agricultural development to address slash and burn – whereas the MCDI REDD+ project is effectively supporting the introduction of sustainable forest management through community based forest management, and is not addressing other (more costly) drivers such as agriculture.

The two TFCG/MJUMITA sites experience relatively high opportunity costs and significant implementation costs due to the need to address charcoal and agriculture deforestation drivers. Highest opportunity costs are encountered for the JGI project site (e.g. 2,806 US$/ha for the agriculture, Figure 4). Thus, the JGI project

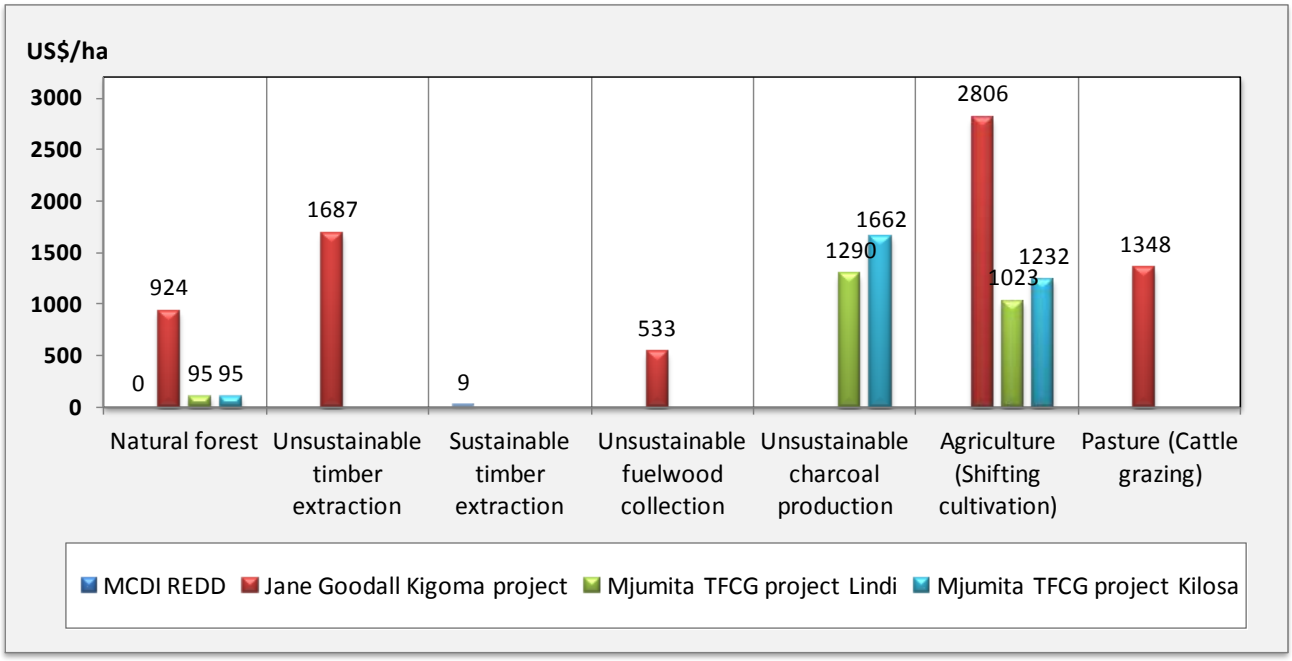

Figure 4: Opportunity costs for pilot projects per ha

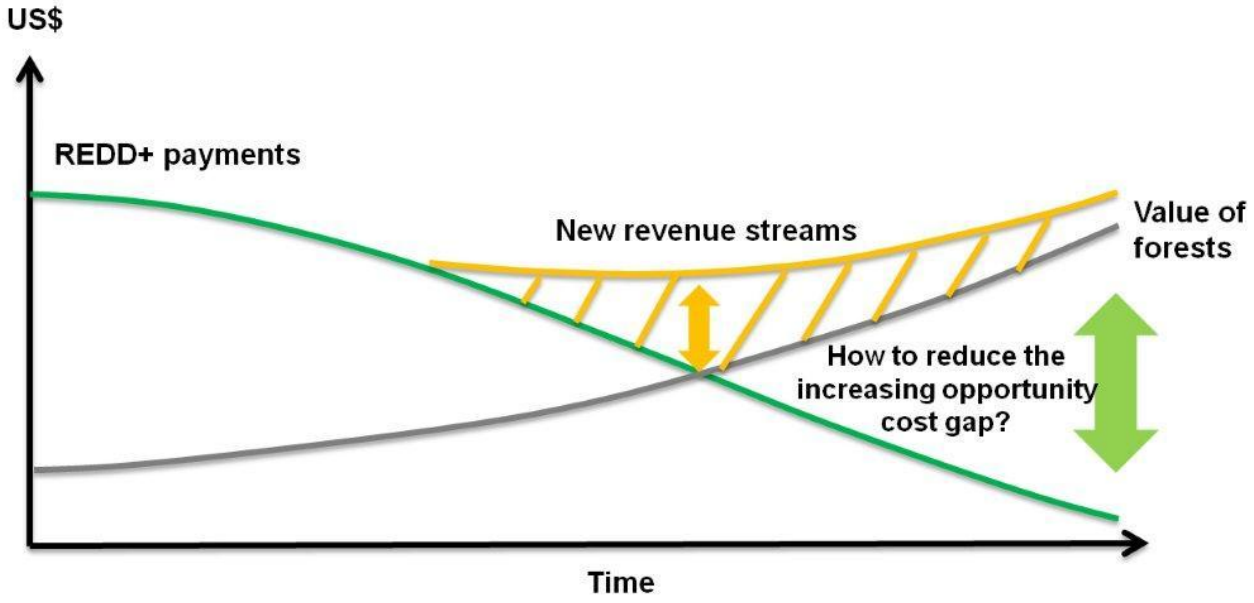

Figure 5: REDD+ Revenue Streams and Increasing Opportunity Costs

appears to be more expensive with regard to implementation costs faced in this zone. The MCDI REDD+ project does not account for any opportunity costs while implementation costs are comparatively low.

Considering that the combined costs of REDD+ should aim at bringing down opportunity costs in the respective project sites, implemented project activities must aim at alternative income generating activities in addition to the revenue streams expected from carbon sales. For example, in the JGI project, the annually invested costs of 8.9 US$/ha should generate revenues and benefits that address the opportunity costs of 2,806 US$/ha for agriculture.

Conclusions and policy messages

The REDD+ cost curve is a useful and flexible tool well suited to the Tanzanian context where REDD+ projects continue to be designed and real data continues to become available. The cost curves allow project developers to determine the carbon price that would be required to meet the opportunity cost of selected land use practices, and the total amount of emission reduction that could be obtained for each land-use type. The tool allows for forecasting the impact of policy changes, such as improved forest law enforcement or agricultural subsidy programmes, on the total REDD+ costs within any given project. The tool also allows for national cost curves to be generated from individual project data inputs over time.

The anticipated revenues from REDD+ cannot be expected to cover all REDD+ costs for projects aiming to address deforestation drivers such as agricultural expansion or charcoal production. As such, REDD+ initiatives need to be closely integrated with other sectoral investment plans (such as agriculture and energy) to ensure harmonization of plans, and to offset implementation costs

Current REDD-readiness planning in Tanzania is being undertaken in anticipation of a future REDD+ compliance market. While REDD+ revenues may be significant initially, they are certain to decline as deforestation rates drop. It will be important to channel a significant share of revenues into raising the value and productivity

of both forests and surrounding landscapes to provide alternative – and sustainable – revenue streams in the future. This is illustrated in Figure 5.

One of the outputs of the study described in this document is a software tool that can be used by both government and projects to estimate and monitor the combined costs of REDD+. Over time, as additional data from different sites is included in the opportunity cost curve, a more complete picture can be generated.

With time, it will be possible to develop an accurate national opportunity cost curve, giving the national average opportunity costs of alternative land uses and potential emission reductions that could be achieved.

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Summary of Conclusions and Policy Messages

1) The costs of REDD+ are made up of four main elements – Opportunity Costs, Implementation Costs, Transaction Costs and Institutional Costs. All four of these cost elements must be considered if we are to estimate the combined costs of REDD+ pilot activities.

2) REDD+ initiatives at all levels need to be closely integrated with other sectoral investment plans (such as agriculture and energy) to ensure harmonization of activities, and to offset high implementation costs.

3) The costs of REDD+ implementation in those pilot projects addressing deforestation drivers such as agricultural expansion and charcoal production, are likely to exceed any potential revenue generated solely through the sale of carbon credits on the voluntary or future compliance markets.

4) While REDD+ revenues may be significant initially, they will decline as deforestation rates drop. It will be important to channel a significant share of revenues into raising the value and productivity of both forests and surrounding landscapes to provide alternative (and sustainable) revenue streams in the future.

5) The REDD+ Task Force, government agencies and REDD+ projects should promote the use and further development of the software tool developed in this study. By adding additional data from a range of sites, a national REDD+ opportunity cost curve can be generated.