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TFCG and MJUMITA launch community REDD project

On 6th November, the Ambassador of Norway launched the project 'Making REDD work for communities and forest conservation in Tanzania'. The project is a partnership project between the Tanzania Forest Conservation Group (TFCG) and the Tanzanian Community Forest Conservation Network (MJUMITA). The project aims to reduce greenhouse gas emissions from deforestation and forest degradation in Tanzania in ways that provide direct and equitable incentives to communities to conserve and manage forests sustainably. The project is being financed by the Norwegian Ministry of Foreign Affairs as part of Norway's commitment to assist Tanzania to get ready for REDD.

Every year Tanzania loses approximately 412,000 ha of forest. Much of this deforestation takes place outside of reserves, on unreserved land under the authority of Village governments. Whilst participatory forest management has succeeded in improving the protection of 2.3 million hectares of forest on village land, unreserved forests on village land are particularly vulnerable. REDD offers an opportunity to make 'forest' a more attractive land use by paying communities and other stakeholders to reduce deforestation and forest degradation on their land. REDD could also contribute to securing the longer term sustainability of existing village forest reserves by providing

Norwegian Ambassador to Tanzania, Jon Lomoy, launches the TFCG / MJUMITA Community REDD project with Patrick Qorro, TFCG Chairperson, Rahima Njaidi, MJUMITA Executive Director and Charles Meshack, TFCG Executive Director to his left. Photo by Nike Doggart.

This edition of the Arc Journal is focused on Reducing Emissions from Deforestation and forest Degradation (REDD) in Tanzania

additional incentives to avoid deforestation and forest degradation within the reserves.

If done in an efficient and equitable way, REDD could bring significant benefits to Tanzania including contributing to poverty reduction, rural development, improved governance and the protection of the nation's forest biodiversity and water sources.

For communities to engage successfully with REDD, they will need to address a number of technical, legal, financial and governance-related issues. The aim of the TFCG / MJUMITA project is to assist communities to find a way to address these potential barriers and to pilot ways in which this can be scaled up to benefit communities across the country.

The project will achieve this by modelling an approach that allows communities to aggregate their emission reductions in such a way that transaction costs are reduced whilst meeting internationally recognised REDD standards. This will be achieved through the existing network of communities involved in participatory forest management, MJUMITA (Mtandao wa Jamii wa Usimamizi wa Misitu Tanzania).

The project includes an evaluation and communication component designed to capture the lessons learnt in order to inform project implementation and share them with the national and international community. This includs sharing lessons learnt during project inception at the 15th Conference of Parties of the United Nations Framework Convention on Climate Change to be held in Copenhagen in December 2009. The project also focuses on building in-country capacity with regards to REDD at both local and national governmental levels. This is linked with a strategic advocacy component aimed at forging a smooth path for REDD in Tanzania by engaging in the formulation of REDD frameworks and processes at national and international level.

The project will focus on an area covering 50,000 hectares of montane and lowland coastal / miombo forest in the Eastern Arc Mountains and Coastal Forest biodiversity hotspots. The project will introduce participatory monitoring of forest status, establish baselines of deforestation rates, market carbon credits, test benefit sharing mechanisms, and help to address the drivers of forest loss and degradation. By the end of the five years, the project aims to achieve a 110,000 tonne reduction in carbon dioxide emissions from deforestation and degradation, and to ensure the livelihoods of 20,000 poor people become beneficiaries from sustainable forest management and REDD financing.

The project is a 5 year project that will run from September 2009 to August 2014.

Other collaborating institutions include:

- The Faculty of Forestry and Nature Conservation at Sokoine University of Agriculture (SUA)
- Clinton Foundation
- Institute of Resource Assessment, University of Dar es Salaam
- Tanzania Natural Resources Forum
- CARE International
- Regional Community Forestry Training Centre (RECOFTC)
- The Valuing the Arc project
- Katoomba Group

TFCG and MJUMITA will also be working closely with the National REDD Task Force, local government, the Forestry and Beekeeping Division, the Vice President's Office and other parts of the Government of Tanzania.

Charles Meshack, Executive Director of TFCG shakes hands with the Minister Counsellor of the Royal Norwegian Embassy upon the signing of the contract for the project 'Making REDD work for communities and forest conservation in Tanzania' with Yassin Mkwizu of the Royal Norwegian Embassy (right) Photo by Nike Doggart.

Getting REDDy in Tanzania:
principles, preparations and perspectives

Simon Milledge[1]

Climate change and forests

Climate change is one of the most pressing issues of this generation, forcing the global community[2] to actively search for more effective and innovative interventions and safeguards. One new mechanism under consideration for post-2012 international climate change commitments is known as **Reduced Emissions from Deforestation and forest Degradation in developing countries (REDD)**, following recognition that forest clearance and degradation is the cause of almost one fifth of global greenhouse gas (GHG) emissions (Figure 1). It is also apparent that achieving REDD is a relatively cost effective means to address climate change.

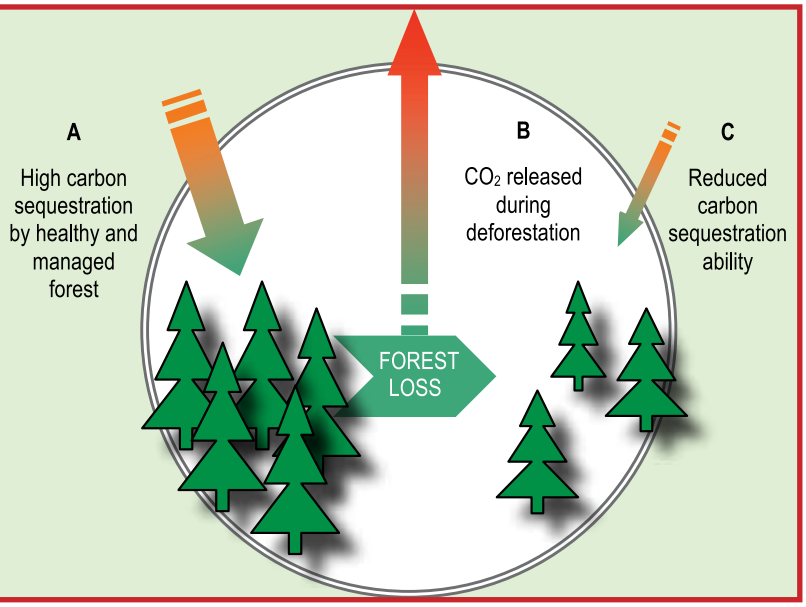
Figure 1

How forest loss causes climate change

A Trees convert carbon dioxide, a greenhouse gas, from the atmosphere into carbon stored in roots, branches and leaves. This process, known as *carbon sequestration*, is good for climate change mitigation.

B The clearance (deforestation) of forests, especially when combined with burning, results in carbon being converted back into carbon dioxide.

C In addition, deforestation reduces the capacity for carbon sequestration, as does more gradual forest degradation.



Understanding REDD, REDD+ and REDD++

Rooted in the underlying philosophy of REDD is the premise that a country successfully reducing the rate of GHG emissions from deforestation and forest degradation should be financially rewarded for helping to provide the world with a "cleaner pair of lungs". A REDD mechanism would be a **results-based payment for providing a global environmental service**; payments dependent upon verified emission reductions.

As a global challenge, REDD needs to be as inclusive as possible, yet achieving global consensus is a big task. Firstly, **circumstances vary enormously around the globe**, especially with regard to the historical and current status of forests and management regimes. For example, while REDD needs to make the strongest difference in countries with high rates of deforestation, it is also important that countries with a good record in forest management are recognized and that REDD does not generate perverse incentives to reduce tree cover. In this regard, recent REDD dialogue has moved towards a likely consensus that REDD will become what is known as REDD+ (REDD plus stabilization, conservation, maintenance and enhancement of forest carbon stocks). Circumstances also vary enormously in

1 Simon Milledge is a consultant with the Royal Norwegian Embassy in Tanzania. This article does not necessarily reflect the views and opinions of the Embassy or Government of Norway.

2 The international community working towards a comprehensive, fair and ambitious international climate change agreement under the auspices of the United Nations Framework Convention on Climate Change.

terms of drivers of deforestation, land use options and opportunity costs. Bearing in mind this wide diversity of circumstances, among the guiding principles now generating greater consensus is the **need to ensure that REDD is matched to national circumstances and sustainable development goals**.

A second challenge to achieving global consensus on REDD arrangements is the **complex nature of REDD requirements**. For example, highly technical issues surround the assessment of baselines, emission reductions, permanence and additionality, while multifaceted legal and fiscal considerations concern contracting, liability, financial flows and verification.

The 100+ nations involved in REDD dialogue have helped achieve relatively advanced discussions as compared to other aspects of the post-Kyoto protocol discussions, although various issues remain to be agreed. Some issues of contention remain on the issue of whether REDD+ should become REDD++, through the incorporation of further detail on environmental, livelihood and governance safeguards.

Incentives of REDD+ for sustainable development in Tanzania

With approximately one third of the land area covered by forest, Tanzania is already playing an important "sink" role in carbon sequestration. At the same time, deforestation rates are high – around 400,000 hectares annually according to the FAO 2005 Forest Resource Assessment, equivalent to 1% of the forest estate – and so Tanzania is an important source of GHG emissions (estimated at up to 100 million tonnes annually). In addition to the longer-term benefits of climate change mitigation, a primary **incentive of reducing deforestation would be to become a beneficiary of a future REDD financing mechanism**.

However, the **incentives of achieving REDD potentially goes far beyond direct economic benefits**. Table 1 highlights how improved forest management, a key ingredient for achieving REDD+, could have a positive impact on priority policy arenas including food, energy and water security, rural development and biodiversity conservation.

Table 1

Examples of major forest management benefits to development in Tanzania

Policy area	Incentives to achieve REDD+ in Tanzania
Economy	Revenues from REDD+ payments, employment, taxes, and trade in forest products under sustainable forest management
Food security	Ensuring agricultural productivity by maintaining irrigation and soil fertility requires the conservation of forest catchments
Energy security	Forests support most of the country's energy supply: hydroelectric constitutes 80% of all electrical power generation, 93% cooking energy is derived from wood-based fuels
Access to water	Forests preserve the sources of many urban water supplies, including Dar es Salaam, Tanga, Moshi and Morogoro
Rural development	Many rural Tanzanians are forest dependent in terms of income generating activities and acquiring subsistence goods and services. Forest carbon trading could bring direct financial rewards to rural communities.
Climate change mitigation	A large proportion of Tanzania GHG emissions derive from the high rate of deforestation (approximately 400,000 ha annually)
Climate change adaptation	Controlling deforestation will be increasingly important for agricultural adaptation and erosion control
Biodiversity	The Eastern Arc Mountains and Coastal Forests are among the top ten global biodiversity hotspots, and are also important for tourism

Achieving REDD readiness

Tanzania has been at the forefront of advancing the policies and practices of participatory forest management (PFM), and **Tanzania is similarly positioning itself as a leading player on REDD**. A national government-led task force is developing a national REDD strategy, while many actors are

organizing themselves to contribute towards national and sub-national REDD readiness. Globally, experience from Tanzania will be important to ensure a future international REDD mechanism considers circumstances outside the mainstream tropical forest debates in places like the Amazon and Congo Basin. REDD readiness initiatives in Tanzania include:

- Tanzania is one of the initial countries under the **UN REDD programme**, a collaborative initiative between FAO, UNDP and UNEP designed to assist developing countries get 'REDD ready' and support appropriate measures. Tanzania is currently implementing a national forest resource assessment that is considering REDD carbon accounting needs.
- Tanzania is also included in the **World Bank's Forest Carbon Partnership Fund**, which was launched at the Bali UN climate talks in 2007. The FCPF has two mechanisms, the Readiness Mechanism to assist developing countries prepare for REDD, and a Carbon Finance Mechanism to pilot incentive payments for REDD.
- Tanzania is a focal country of **Norway's International Climate and Forest Initiative**, with up to NOK 500 million committed over five years. Other development partners may also develop bilateral initiatives relating to REDD in the future.

UN REDD programme in Tanzania outcomes

1. National governance framework and institutional capacities strengthened for REDD
2. Increased capacity for capturing REDD elements within National Monitoring, Assessment, Reporting and Verification Systems.
3. Improved capacity to manage REDD and provide other forest ecosystem services at district and local levels.
4. Broad based stakeholder support for REDD in Tanzania.

Some elements within the Tanzania-Norway partnership on climate and forests

1. National REDD strategy development
2. Investments in MARV
3. Establishment and piloting of Trust Fund
4. Public sector initiatives
5. Sub-national REDD pilots
6. Research and capacity building
7. Private sector engagement

Early REDD implementation: amplifying and augmenting

A lot about REDD is not new and Tanzania has been implementing various ingredients of REDD for many years. The extensive PFM experience has helped demonstrate successes, such as the improved forest condition in PFM areas, as well as highlighting key challenges such as benefit sharing, local governance and land tenure. Such experiences and ongoing initiatives are invaluable to REDD, as are those from sustainable forest management, protected area management, land use planning, sustainable agriculture, and piloting of payment for environmental services schemes.

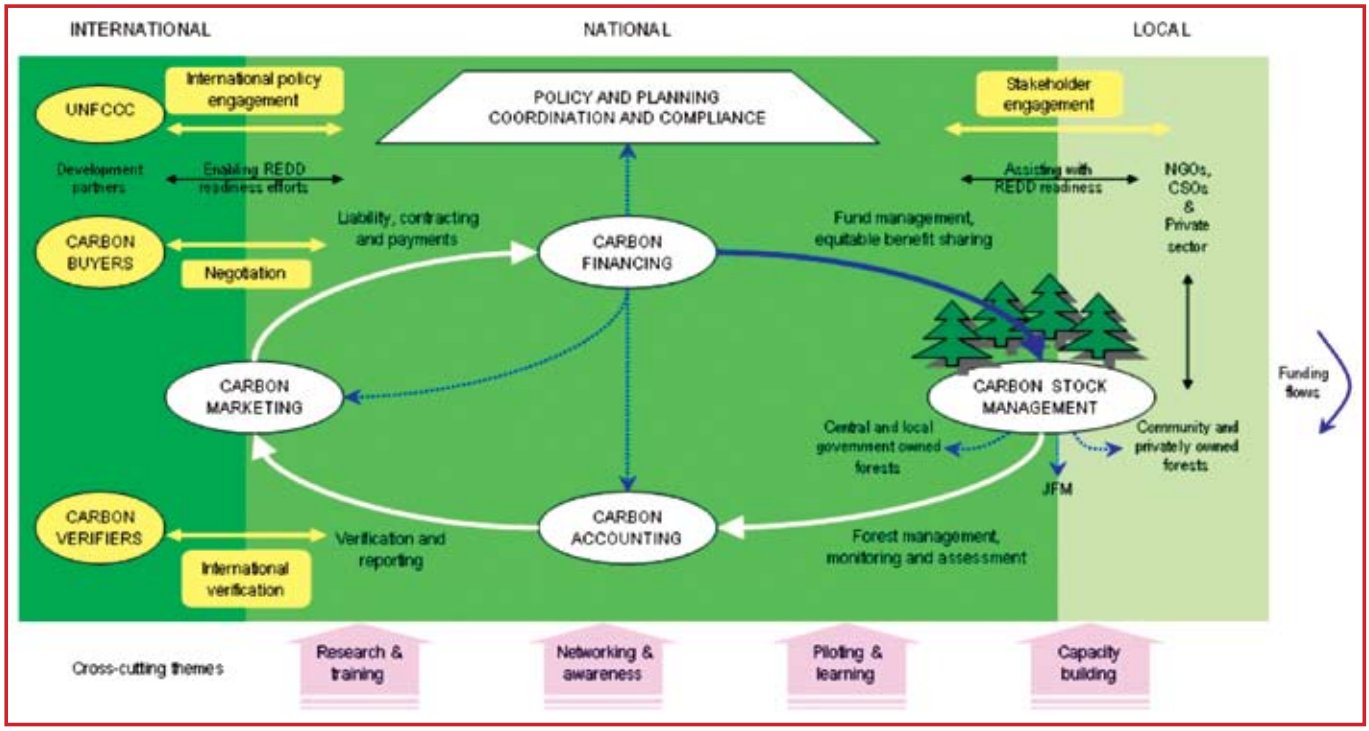
At the same time, there are **additional elements required for Tanzania to fully engage with REDD opportunities** in terms of policy framework, institutions, capacities and technologies. The following diagram illustrates some of the key nodes of REDD implementation required at the national level for not only managing forests, but also enabling the co-ordination, accounting, marketing and financial arrangements for forest carbon. Many of the same nodes are applicable to local level arrangements. **Tanzanian stakeholders will need to define how such nodes of REDD responsibility will be shared in the most efficient, effective and equitable manner**.

Realizing the potential incentives for achieving REDD naturally requires addressing the drivers of deforestation and forest degradation. Examples of immediate drivers include the conversion of land to agriculture (commercial and subsistence), unsustainable harvesting for charcoal production and timber trade, uncontrolled fires and grazing. **Interventions to address these drivers require responsible consideration of potential policy outcomes.** For example, an optimal balance of social, economic and environmental trade-offs should be sought regarding different land use options such as forest carbon, food production (crops and livestock), fuel supply (charcoal, biofuels) and other commercial interests.

Multi-disciplinary (and multi-sectoral) **approaches and the engagement of private sector** (both formal and informal) are likely to be important ingredients in harnessing key players to

Figure 2

Diagram illustrating some key elements for REDD implementation in Tanzania



address drivers. As such, efforts will be required to create sufficient incentives for the private sector (which includes individual subsistence farmers) to achieve REDD. Fundamentally, of course, it will be necessary to determine whether the potential income levels from forest carbon payments (depending on deforestation and emission baselines and projections), after deduction of transaction costs, would be sufficient to offset the opportunity costs of foregoing certain land use options in favour of trees. **Tanzanian stakeholders will need to define how drivers of deforestation can be addressed in the most efficient, effective and equitable manner that is supportive of sustainable development.**

Key perspectives and issues for consideration

Balancing differing perspectives of many levels of actor will be a key aspect for consideration during the process of achieving REDD readiness, requiring adequate participatory consultation, piloting and analysis. The following table illustrates how different actors may have quite different interests, which centre on some of the most critical issues for the REDD programme in Tanzania (and globally) to address.

Table 2
Illustration of differing REDD interest groups and perspectives for consideration

Category of actor	Examples of common priority perspectives
National (public sector)	Finance mechanisms (sustainability and predictability), technology transfers, sustainable development, carbon accounting aggregation
International community	Accountability, governance (with sovereignty), additionality, permanence
Sub-national (government and rural communities)	Benefit sharing, security of rights (land tenure, resource access), stakeholder participation
Civil society organizations	Social and environmental safeguards (co-benefits)
Private sector	Inclusion, incentives

It is already evident that engaging with REDD in Tanzania presents enormous challenges in terms of its scope, scale, multiple interest groups and technicalities. At the same time, the potential opportunities of REDD are substantial. Fortunately, REDD development in Tanzania bodes relatively well due to a combination of national leadership, resource mobilization, engagement with numerous international initiatives, and the increasing involvement of local-level actors. The challenge at hand requires **collective actions that are both bold and responsible**.

Need for greater harmonisation of forest carbon monitoring and verification for REDD

Eliakimu Zahabu and Rogers E. Malimbwi, Sokoine University of Agriculture

Introduction

In most systems that credit carbon emissions reductions, a baseline is required against which the reductions can be compared. However, the nature of the baseline depends on the accounting rules about what, exactly, can be credited. There is considerable uncertainty at the moment about how baselines may be determined for operationalising REDD, since it is not yet decided what will be included. The first point that needs to be noted is that as REDD is usually conceived, it will be approached at national level reflecting activity across the whole forest estate, and average gains and losses throughout this whole area over a given commitment period[1]. The rewards (carbon credits) would also be issued centrally. The possible options include crediting:

a) reduction in emissions from deforestation i.e. based on comparisons of rates of change of forest area over time,

b) reductions in emissions from degradation, that is to say reductions in biomass / carbon stock in the forest without loss of forest area based on comparisons of rates of loss over time (in practice these rates could be reduced for example by introduction of sustainable forest management practices in logging and other extraction processes),

c) enhancement or increases of forest biomass within areas of existing forest (sometimes referred to as forest restoration),

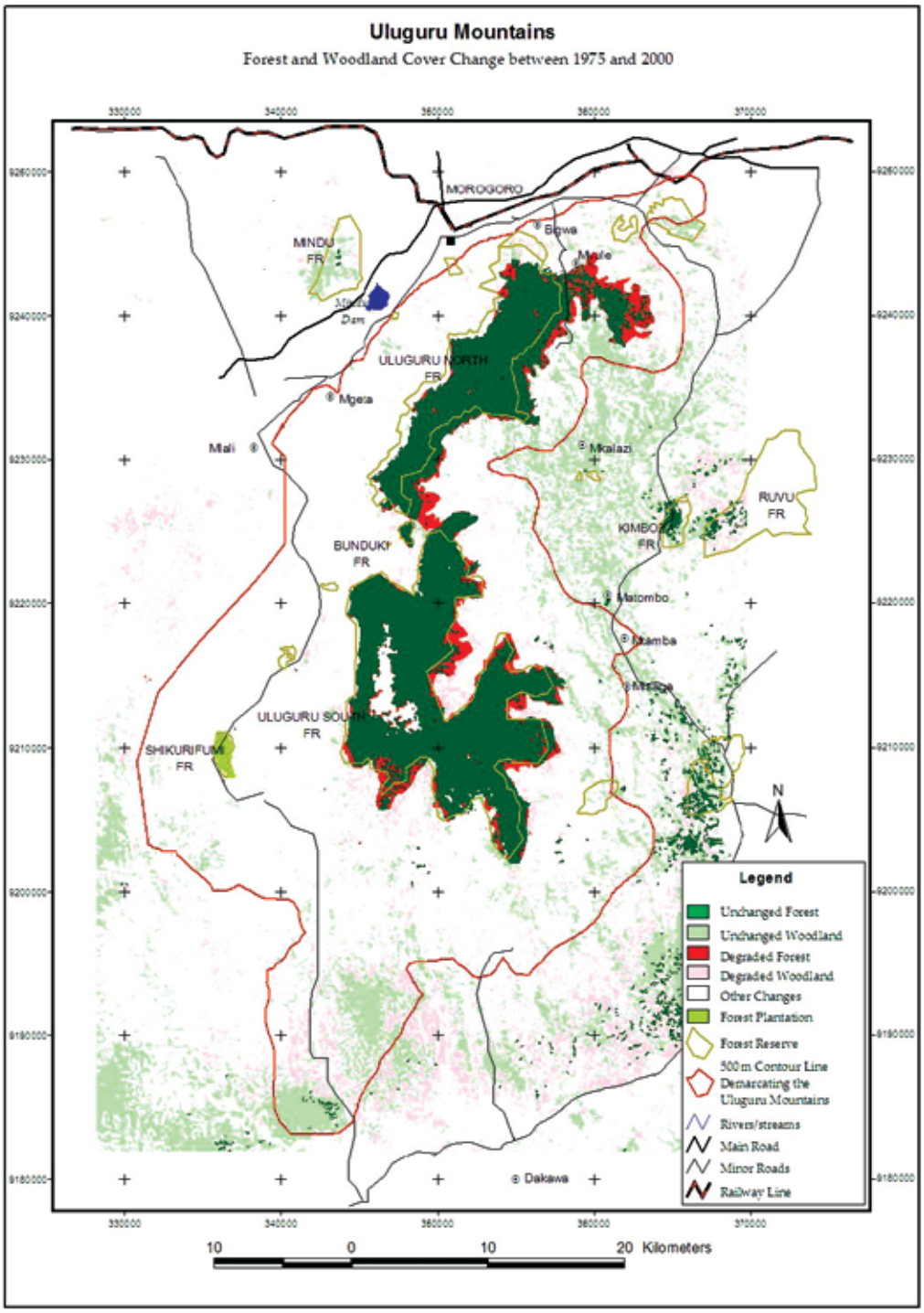
d) conservation (in this context this usually means crediting for maintenance of a steady level of forest area and biomass density i.e. not just for improvements in these values), and

e) carbon stock, under which all forest carbon stock receives some sort of credit.

These five options are not mutually exclusive, and the eventual REDD agreement will probably include provision for several of them (under REDD+), which will require several different approaches to baseline construction.

The last two options (i.e d and e) relate to forests that are already properly managed, although not necessarily for carbon production. This could theoretically apply to forests that have been protected for many years such as forest reserves and national parks which may not be able to profit from REDD if this is limited to reductions in rates of emission. These forests with long protection status could for example be credited based on the maintenance of carbon stock which could be rewarded through a special “conservation” fund that could be included under REDD. However, almost all forests in reserved areas are also experiencing some varying levels of disturbances. Therefore these forests together with those that are used for different wood products such as those under open access situation may also fall on the other three options. They require either historical baselines or assessment of carbon stock change over a given time interval.

1 There has been some discussion about sub-national level approach, but in any case REDD will cover very large land areas.



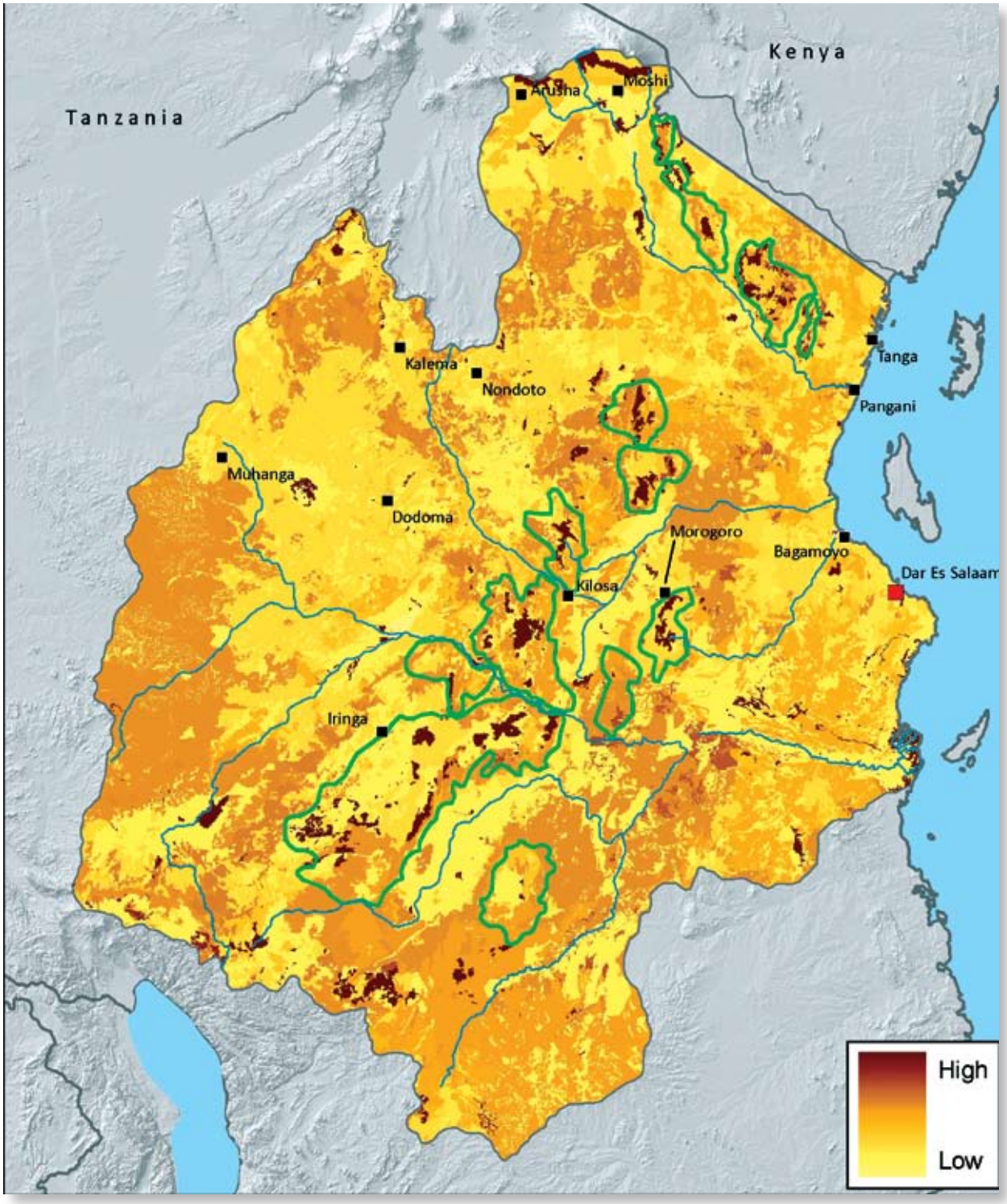
FBD's Conservation and Management of the Eastern Arc Mountain Forests project has carried out forest change analyses for the Eastern Arc Mountains.

Operationalising REDD Baselines

Since the REDD policy is likely to be undertaken nationally, the country deforestation baseline would be determined by depicting historical land use changes from satellite imageries and typical carbon stock data for different types of forests to calculate the changes in terms of tons of carbon. After developing national level reference scenarios for the whole country, the system of interlocked baselines is needed to operationalise REDD internally for the different geographic regions and to account for different forest regimes e.g. national parks, forest reserves, community forests, and private forests. This system is needed in order to provide incentives to stakeholders who are responsible for reductions in carbon losses within the country. The sum of the different baselines for deforestation from different regions, and degradation and forest enhancement from different regimes will add up to the national reference scenario.

Individual management regimes would then be credited depending on their mitigation levels in the commitment period. From the start of the project, monitoring is done to determine the standing stock in the project area. At any accounting time the difference between the carbon emissions or removals from the project activities compared to the baselines provide the basis for calculating the carbon value to be credited.

The carbon benefits of individual forests will therefore be determined by assessing and monitoring carbon stock changes from the forests through forest inventory techniques. From these measurements, the rate of forest degradation and enhancement may be established from which the carbon benefits will be computed.



Detailed carbon stock data is already available for Tanzania's Eastern Arc mountains as a result of the Valuing the Arc project www.valuingthearc.org

Forest inventory techniques for assessing and monitoring carbon

There are commonly acceptable principles of forest inventory following standard procedures on sampling determination, sample plot layout, tree measurement techniques and data analysis. Most forest inventories have been done by professionals because this is regarded as a professional activity which requires highly specialised skills and education. In Tanzania forest inventories have been carried out by specialised technical staff from the Forestry and Beekeeping Division, Sokoine University of Agriculture and the Tanzania Forest Research Institute. However, of recent we are witnessing a very large group of stakeholders engaged in the REDD business. These range from local communities, non-governmental organisations and other government institutions.

This mix of stakeholders comes with different ideas on how forest inventories should be undertaken. With a view to reducing the costs of monitoring by forest owners, different models of participatory forest inventories are being explored for use in REDD projects. Since the data from these different stakeholders will need to be synthesised for national reporting purposes, there is a need to harmonise the inventory procedures adopted by different projects.

Participatory forest inventories are being explored for use in REDD projects. Photo by Tom Blomley.

Verification of the measurements

Before carbon credits can be traded, verification of the measurements is necessary. Verification is done by an independent party and establishes that the carbon measurements are reliable and accurate. Both within the country and international level verification will be necessary since the baselines will be set at these levels. The verification of the national baselines for international trading will require an independent verifier. Within the country an independent party would have to be a licensed and registered agent, in the same sense as a chartered accountant, but would not necessarily have to be external to the country. Ideally the verifier will undertake ground spot measurements to check the accuracy of the field measurements by the different forest owners. After verification, carbon will be purchased through the national REDD scheme.

Proposal for REDD monitoring and verification

The country will need to identify an international independent verifier. Similarly, the system for independent verification at the national level is required. The idea proposed in the National Framework for Reduced Emissions from Deforestation and Forest Degradation is to establish an independent semi-autonomous National Carbon Monitoring Centre (NCMC) for this purpose. Apart from verification of the carbon data using approved guidelines, the NCMC will among other things undertake the follow core tasks:

- Development and updating of a national baseline database using data from NAFORMA
- Development and improvement of approved carbon assessment methods,
- Training of foresters on the approved carbon assessment methods,
- Development and maintenance of the carbon database,
- Analysis of data, and
- Submission of the results to the government REDD scheme and stakeholders
- Submission of the data to the NAFOBEDA

With NCMC in place the coordination of the monitoring, reporting and verification will be efficient.

Saving Forests to Reduce Global Warming : the United Nations "REDD" Programme in TANZANIA

UN-REDD PROGRAMME

Neil D. Burgess, Tim Clairs, Niklas Hagelberg, Christognus Haule, Felician Kilahama, Edward Kilawe, Gertrude Lyatuu and Nik Sekhran

Human destruction of tropical forests is estimated to contribute around 20% of the total greenhouse gas emissions in the world, leading to global warming. A proposed global climate change reduction mechanism aims to 'Reduce Emissions from Deforestation and forest Degradation - REDD'.

The UN-REDD Programme, a collaborative partnership between FAO, UNDP and UNEP, supports countries to develop capacity to reduce emissions from deforestation and forest degradation and to implement a future REDD mechanism. The overall aim of UN-REDD is to generate the requisite flow of financial and technical resources to significantly reduce global emissions from deforestation and forest degradation. A more immediate goal is to assess whether carefully structured payment mechanisms, and capacity building, can create the incentives to ensure actual, lasting, achievable, reliable and measurable emission reductions - while also maintaining and improving the other ecosystem services that forests usually provide.

The UN REDD pilot country programmes are supposed to inform the development of the REDD mechanism that will form a part of the negotiations of the UN Framework Convention on Climate Change. This is part of an international move to include REDD in new and more comprehensive UN climate change arrangements to kick-in post 2012; which will form the basis of the discussions in Copenhagen in December 2009.

Tanzania is one of nine pilot countries where UN assistance will be channeled to assist the government get 'ready' for REDD. A detailed proposal for UN REDD interventions in Tanzania has been developed over the past year. These interventions are based on the history of forestry activities (including laws, regulations, implementation modalities etc), the needs of the UN REDD programme internationally, and the results of other initiatives being undertaken in Tanzania.

This paper presents background information on the forests of Tanzania, the rates of forest loss due to deforestation, the levels of forest degradation, and the consequences for carbon storage. It also outlines the UN REDD programme for Tanzania, including some of the proposed mechanisms to implement the programme.

Tanzanian forests

In terms of forest cover, Tanzania has a total of 33.5 million hectares of forests and woodlands that constitute 38% of the total land area in the mainland. The total area is divided into a number of different forest types, as summarized in Table 1. These various forest types contain carbon in different densities and the various forest types have other values in terms of biodiversity and social attributes.

Drivers of deforestation and degradation in Tanzania are wild fires, agricultural expansion, livestock grazing, unsustainable logging and firewood collection, illegal mining, pit sawing, and illegal harvesting for building materials, firewood harvesting and charcoal making. These drivers of deforestation and degradation are mainly linked to the expanding human use of the natural environment to supply food, building materials and cooking fuel to the people of the country.

Table 1. Forest Area in Tanzania

Forest type	Historical Area	Area 2000
Miombo Woodlands	40% of land area (rough estimate) [1]	Only partial data
Acacia Savanna	No data	No data
Eastern Arc Mountains [2]	1,799,200 ha	353,100 ha
Kenya/Tanzania Mountains	No data	No data
Eastern African Coastal Forests[3]	13,637,900 ha	684,100 ha
Guinea-Congolian forests[4]	Below 1,000,000	670,000 ha
Mangrove forests[5]	No data	108,100 ha
Albertine Rift forests	No data	No data
Southern Rift forests	No data	No data
Itigi Thicket	No data	No data

1- Estimated from landcover maps for Tanzania
2 – (FBD 2005) *Forest Area assessment for the Eastern Arc Mountains*. Forestry and Beekeeping Division, Ministry of Natural Resources and Tourism, Dar es Salaam. www.easternarc.or.tz
3 – Tabor, Mbilinyi, Kashigali and Burgess (submitted). Forest area assessment for the coastal forests (this assumes that all this ecoregion was originally forested).
4 – GEF Cross Borders Project (2000-2004).
5 – Wang *et al* 2003. Remote Sensing of Mangrove Change Along the Tanzania Coast. Marine Geodesy, 26:35–48.

Deforestation

The forest area in Tanzania is declining. The latest estimation of the deforestation rate nationally is around 400,000 ha per annum. More detailed deforestation rates for some specific forest types in Tanzania are available; for example in the Eastern Arc Mountains and the lowland Coastal Forests, where rates of deforestation have been calculated from 1990-2000, are currently being updated to 2005 (Table 2). In general the closed canopy forest habitats declined quite slowly (-1 to -7%) over the period 1990-2000, whereas miombo woodlands declined more rapidly (-13%). Several forest types in Tanzania have no reliable estimate of their area, or rate of loss. This is clearly an important additional knowledge to be acquired to support the REDD process in Tanzania.

Table 2. Rates of forest loss in the main forest types of Tanzania 1990-2000 (where known)

Forest type	Area 1990	Area 2000	Percentage loss %)
Miombo Woodlands[1]	Only partial data	Only partial data	- 13%
Acacia Savanna	No data	No data	
Eastern Arc Mountains [2]	355,000 ha	353,100 ha	- 1 %
Kenya/Tanzania Mountains	No data	No data	
Eastern African Coastal Forests[3]	704,200 ha	684,100 ha	- 7 %
Guinea-Congolian forests	No data	670,000 ha	
Mangrove forests[4]	109,500 ha	108,100 ha	- 2 %
Albertine Rift forests	No data	No data	
Southern Rift forests	No data	No data	
Itigi Thicket	No data	No data	

1- Data from a partial sample of miombo in Eastern Tanzania (FBD 2005) *Forest Area assessment for the Eastern Arc Mountains.*. Forestry and Beekeeping Division, Ministry of Natural Resources and Tourism, Dar es Salaam. www.easternarc.or.tz
2 – FBD 2005 (ibid).
3 – Tabor, Mbilinyi and Kashigali (in prep). Forest area assessment for the coastal forests (this assumes that all this ecoregion was originally forested).
4 – Wang *et al.* 2003. Remote sensing of mangrove change along the Tanzania coast. Marine Geodesy, 26:35–48.

Degradation

In terms of degradation, it is estimated that over 500,000 hectares of forests and woodlands especially in general lands are degraded annually. Various studies have been conducted to determine the levels of degradation to Eastern Arc and lowland Coastal Forests. Considerable effort is required to develop a proper understanding of the level of degradation to the woodland and forest resources of Tanzania, and the impacts of that degradation on carbon storage.

Carbon storage

The amounts of carbon stored in the various forest types in Tanzania are partly known, and are the subject of a number of ongoing research projects, mainly working from the Sokoine University of Agriculture (SUA). Examples of the mean values of tons of carbon per hectare of habitat from the available studies are as follows: Miombo woodlands: 87 tons carbon per hectare; Eastern Arc Mountain forest, 306 tons carbon per hectare; East African coastal forests, 157 tons carbon per hectare. Estimates are not available for *Acacia* savanna, Kenya/Tanzania volcanic mountain forests, Guinea-Congolian forests, Albertine Rift forests, Southern Rift forests, Itigi Thicket or Mangrove forest.

Carbon loss through deforestation

Tanzania does not have data to facilitate calculation of carbon loss through deforestation for each of its various forest types. However, in the Eastern Arc mountains, remote sensing of forest loss tied to estimates of carbon content for various forest types, shows that deforestation over the past 20 years has resulted in the loss of some 34 million tons of carbon from these mountains (Table 3). Much of this loss emanates from the unprotected woodlands and forests outside the network of protected areas Similar calculations are possible for the coastal lowland forests where deforestation rates are known and estimates of carbon stored in different tree species are available.

Table 3. Impacts of degradation on the carbon stored in Tanzanian forests (stem, branches, and roots – not soil carbon)

Forest type	Carbon in pristine forest (tons/ha)	Carbon in heavily degraded forest (tons/ha)	Loss through degradation (tons/ha)
Miombo Woodlands	87	33	54
Acacia Savanna	No estimates available	No estimates available	-
Eastern Arc Mountains	306	83	223
Kenya/Tanzania Mountains	No estimates available	No estimates available	-
Eastern African Coastal Forests (Dar to Rufiji)	157	33	124
Guinea-Congolian forests	No estimates available	No estimates available	-
Mangrove forests	No estimates available	No estimates available	-
Albertine Rift Forests	No estimates available	No estimates available	-
Southern Rift forests	No estimates available	No estimates available	-
Itigi thicket	No estimates available	No estimates available	-

All data from: FBD, 2007. *Carbon Ecological Services*. Forestry and Beekeeping Division, Ministry of Natural Resources and Tourism, Dar es Salaam. www.easternarc.or.tz

Carbon loss through degradation

There is not much data across Tanzania on the impacts of disturbance on carbon storage. This is a clear knowledge gap that needs to be addressed. Detailed assessments of levels of degradation and some of the likely impacts on carbon storage are available for the Eastern Arc Mountains and lowland coastal forests, and for a few areas of miombo woodland (Table 3). These indicate that degradation processes in the Eastern Arc Mountain forests, for example, can reduce the carbon storage from 300 tons per hectare in pristine forest, to less than 100 tons per hectare in degraded forest. Across the Eastern Arc Mountains this equates to a potential loss of 66 million tons of carbon from reserves, which might be regained if the reserves were better managed. Degradation reduces carbon storage in coastal forests from 157 to 33 tons per hectare, and in woodlands from 87 to 33 tons per hectare (Table 3). For some other forest types there are no available data on the impacts of degradation on the carbon storage.

The UN REDD programme in Tanzania

The UN REDD Programme support will be directed through four outcomes, which are fully aligned with the National Forest Programme and the national REDD framework.

Outcome 1. National governance framework and institutional capacities strengthened for REDD

This component will build capacity to implement REDD within the Forestry and Beekeeping Division of the Ministry of Natural Resources and Tourism, and the Vice President's Office (Environment). The component will also help finalise the national REDD framework and strategy and to clarify roles, structures and social safeguards for effective implementation of REDD in Tanzania.

Outcome 2. Increased capacity for capturing REDD elements within national Monitoring, Assessment, Reporting and Verification (MARV) systems

This component will support REDD in Tanzania by implementing a system for monitoring forest cover, forest change, carbon stocks and carbon emission levels in Tanzania. Potential co-benefits of REDD (biodiversity and social attributes) will also be determined. The component will also provide capacity building in the form of training on remote sensing and mapping.

Outcome 3: Improved capacity to manage REDD and provide other forest ecosystem services at district and local levels

This component will build the capacity of the decentralized forest sector to implement REDD in Tanzania. Some pilot projects will also be established that will test modalities for making payments to forest owners and managers. Lessons will be learned from these tests that will inform the development of broader mechanisms for the whole of Tanzania.

Outcome 4: Broad based stakeholder support for REDD in Tanzania

This component will provide information to forest owners and managers on the potential and complexity of REDD as a forest conservation mechanism. It will also gather thoughts and opinions of owners and managers of forests on how REDD might be made to work in Tanzania. This will be used to further develop the national REDD framework.

Conclusions

This article has summarised the main forest statistics for Tanzania and the approach being taken to implement the UN REDD programme. The UN-REDD programme is a quick start action programme that aims to demonstrate that early results are possible in some of the major forests of the world, and the programme is implemented under the principle of UN 'delivering as one'. In terms of baseline data Tanzania still has a long way to go to develop the required datasets and make the necessary calculations to define the deforestation baseline and set the "Reference Emissions Levels". A mechanism to catalyse REDD will involve complex institutional, financial, technical and development efforts in synergy. In Tanzania there are relatively few people who can work with REDD hence significant further capacity building will be required to facilitate implementation of required work. However, the country has good policies and laws in place that can help guide the implementation of the programme, and it has a very well developed system of forest management in both government managed, community managed and co-managed reserves and other forest management areas. The 'Participatory Forest Management Programme' – in particular, provides a model for how the REDD programme might be rolled out to field level in Tanzania. But, the successful application of REDD will require current users of forest resources to be convinced to change their current resource use practices.

Understanding Eastern Arc Mountain ecosystems: perspectives across space and through time

At the York Institute for Tropical Ecosystem Dynamics (KITE) (http://www.york.ac.uk/res/kite/), a number of nested projects are working to enhance understanding on the ecology of the Eastern Arc Mountain ecosystems at a range of spatial and temporal scales. Running through the KITE group is the wish that the information gathered will assist in the formulation of policy to preserve and protect the Eastern Arc Mountain forests, both for the benefit of global biodiversity conservation and for the people who rely on the forests for provision of ecosystem services; the latter through collaboration with the Valuing the Arc project (http://valuingthearc.org/) and stakeholders in Tanzania and Kenya, in particular the Institute of Resource Assessment and the Botany Department, University of Dar es Salaam and National Museums Kenya. More information of the various elements of KITE, how to collaborate, or use output from the various initiatives can be obtained from contacting any of the researchers mentioned in this article or via Rob Marchant (rm524@york.ac.uk). The four main strands to the KITE team are -

Palaeoecology: Jemma Finch, Vanessa Gelorini, Rahab Kinyanjui, Cassian Mumbi, Veronica Muiruri, Stephen Rucina

This KITE palaeoecology research thread is investigating long-term ecosystem changes in the Eastern Arc, to determine whether long term environmental stability can explain the exceptionally high floral diversity of these mountains. Ecosystem history is being reconstructed using pollen, charcoal, carbon isotope and fungal spore evidence derived from sedimentary records from several Eastern Arc mountain blocs (Uluguru, Udzungwa, Usambara and Pare mountains) and surrounding highland areas (Plate 1) over the past 40,000 years. Long-term environmental stability of the Eastern Arc forests has been proposed as a mechanism for the accumulation and persistence of species during glacial periods thus resulting in the diverse forests observed today. Preliminary results from sites in the Uluguru and Udzungwa Mountains suggest that forest composition has remained relatively stable during the past ~40,000 yrs and, importantly, through the last glacial period, thereby providing strong support for the long term environmental stability of the Eastern Arc. Signals of recent human impact (e.g. impacts of fire, deforestation, agriculture, introduction of exotic species) are being investigated within these records and by close links to another initiative focusing on the historical ecologies of East African Landscapes (http://www.heeal.eu/). In particular, investigating impacts of the caravan routes associated with pre-colonial ivory trade on ecosystem-societal-environmental interrelationships. Additional palaeoecological evidence from adjacent mountains is currently compiled, and will provide greater insight into the stability of Eastern Arc forests as a whole and their relationship to adjacent mountains areas such as Kilimanjaro and the Southern Highlands.

Plate 1: Stephen Rucina and colleagues from the National Museums of Kenya collecting a sediment core from a montane swamp

Genetic diversity: Martin Carr, Alistair Jump

An ongoing project is investigating the genetic diversity of populations of common tropical tree species isolated on different mountains within the Eastern Arc chain. Part of the work is determining if isolation is resulting in significant genetic divergence of populations, and whether the genetic structure of the populations gives us a clue as to when forest species colonised the mountains and where from. So far, the work suggests that the degree of divergence between populations on neighbouring mountains is remarkably high, and in some cases comparable to the degree of genetic divergence between species. This high divergence implies that Eastern Arc forests are remarkably ancient and may have been isolated from one another for hundreds of thousands of years. Similarly high population differentiation has also been reported for many of the region's bird species, further demonstrating the exceptional biodiversity value of the region.

Plate 2: Rob Marchant collecting plant samples from the Uluguru Mountains – such samples are used to understand biogeographical patterns of Eastern Arc forest communities and feed model construction

Biogeography: Anjte Ahrends, Roy Gereau, William Kindeketa, Cosmas Mligo

This research strand focuses on a number of central themes to understand the present distribution of plant communities, relationship with environmental factors and potential deficiencies in data coverage (Plates 2 and 3). In the identification of priority areas for the conservation of tropical forests, we are often faced with incomplete and problematic data. Using simulations and sensitivity analyses, we have been analysing the impact of inadequate data and sampling on predictions of species richness, endemism and the number of rare and/or threatened species in order to contribute towards the development of standard guidelines for vegetation assessments in tropical forests. The Eastern Arc Mountain forests are highly fragmented, and threatened by industrial mining, logging, pole cutting and agricultural encroachment. Having assembled a database of forest vegetation and disturbance, we are modelling patterns of degradation in relation to accessibility and management. The ultimate target is to understand spatial relationships between the flora on different mountain blocs – information that will inform conservation action in the area and develop the relationship between forest dynamics and livelihoods.

Plate 3: Antje Ahrends pressing plant samples on the Lukwangule Plateau Uluguru Mountains for drying and later identification against herbarium specimens.

Modelling and remote sensing: Phil Platts, Andrew Marshall, Philip Omondi, Marion Pfiefer

High-resolution bioclimatic models have been developed to assess the diversity and distribution of forest flora across the Eastern Arc Mountains and within the Kenya-Tanzania Borderlands. Records of observed species occurrence, contributed by the Missouri Botanical Gardens (Tropicos collection, http://tropicos.org/), Frontier-Tanzania (http://frontier.ac.uk/), TFCG (http://www.tfcg.org/) and researchers at the University of York and the African Conservation Centre (http://www.conservationafrica.org/), are regressed against a suite of environmental predictors. Results are predictions of occurrence for a wide range of taxa

(e.g., Figure 1) with some 650 individual species distribution maps now available for the Eastern Arc with this work currently being expanded across Eastern Africa. Using output from the models, individual species are to be grouped into appropriate ecological groups, as determined by, for example, spatial patterns of occurrence or growth form. Spatial predictions can be also compared with satellite-derived forest-cover estimates, hind-cast using pollen data from sediment cores, or linked with climate forecasts to explore how the forests might respond to future climatic change and socio-economic and management scenarios.

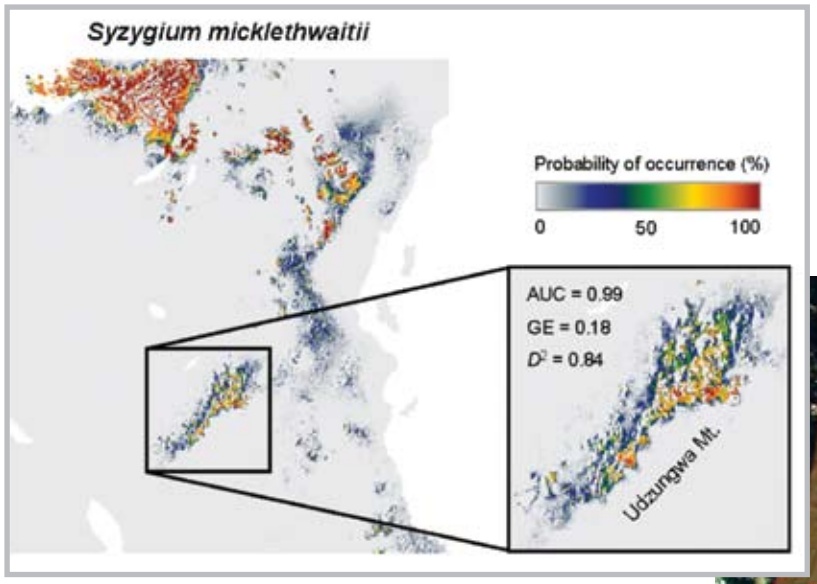


Figure 1. Modelled distribution of Syzygium micklethwaitii. Figure adapted from Platts et al (2008). Predicting tree distribution in an East African biodiversity hotspot: model selection, data bias and envelop uncertainty. Ecological Modelling 218, 121-134.

Synergies and implications for REDD: By developing our approach that operates at a range of temporal and spatial scales, it is possible to understand how the composition and distribution of ecosystems have changed over time. This holistic approach is vital if we are to understand how forest cover may respond to changing climates and changing human-ecosystem interactions in the future. Having such information at the finger tips is particularly relevant to ecosystem management issues such as the current REDD initiative where payments will be made for standing carbon stocks. For example, some of the tools developed in the context of KITE, particularly the remote sensing products and vegetation models, are useful for assessing the carbon value of current 'standing stock', and potentially future shifts in these stocks under different management and climate change scenarios.

Plate 4: Students from the MSc in Natural and Environmental Resource Management (NARAM) during fieldwork to Sanje Waterfall, Udzungwa Mountain National Park.

Photo by: Andrew Perkin

Community participation in REDD: five messages from East African CSOs for the climate change meeting in Copenhagen

'Communities should be actively and meaningfully involved in the planning, implementation, monitoring and evaluation of REDD' was a key message from a group of twenty six East African Civil Society Organisations who met in Dar es Salaam in October. The groups also called for developed countries 'to agree and commit to making deeper emission reductions far beyond the emission reductions currently proposed.'

Nations from around the world are getting ready for the 15th Conference of the Parties of the United Nations Framework Convention on Climate Change (UNFCCC COP 15) to agree essential elements of a comprehensive, fair and effective deal on climate change. In preparation for this meeting, East African civil society organisations came together to agree on key messages to bring to Copenhagen. The group were particularly focused on issues related to community participation in Reducing Emissions from Deforestation and forest Degradation (REDD). The meeting was held between 21st – 22nd October in Dar es Salaam. It was hosted by the Tanzania Forest Conservation Group in partnership with CARE Tanzania through the project 'A stronger voice from the developing countries in the international climate negotiations'. The project is financed by DANIDA.

The meeting highlighted that there is widespread support for REDD amongst both governments and civil society organisations in East Africa. Participants shared a common vision that communities will play a central role in REDD in East Africa and that this will build upon the steps that

Tanzania, Kenya and Uganda have taken towards participatory forest management. There was also consensus that safeguards are needed to protect community rights and other forest values including biodiversity. CARE presented the Climate, Community and Biodiversity Alliance standards that are currently being developed (www.climate-standards.org). There was also agreement that we need to be cautious about how we define the term 'forest' in order to avoid situations whereby natural forests might be cleared to make way for exotic plantations thereby removing all the other benefits that natural forests bring.

Civil society organisations from all three countries stated that so far, community participation had not been sufficient in REDD readiness activities. For example, in Tanzania it was requested that communities and civil society organisations select representatives to sit on the National REDD task force whilst in Uganda, there was a request that communities participate in capacity building activities linked to 'REDD Readiness'. For all three countries, the issue of equitable benefit sharing between governments and communities in relation to revenues from the sale of emission reductions and other forest products was raised as a critical issue, with Ugandan and Tanzanian organisations highlighting the need for countries to take a nested approach whereby not all carbon revenue would need to pass through the government.

For more information please refer to the workshop report which is available at www.tfcg.org/redd

Five messages from East African CSOs for COP 15

1. Communities should be actively and meaningfully involved in the planning, implementation, monitoring and evaluation of REDD.
2. Countries in Annex 1 must agree and commit to making deeper cuts on the emission reductions far beyond the emission reductions currently.
3. Other high polluting countries should also commit to significant emission reductions.
4. Levels of funding for REDD should be commensurate with the opportunity costs foregone by the developing countries.
5. Forests should be well defined within the context of REDD.



From left to right: Xavier Mugumya from the Ugandan National Forest Authority, Christognus Haule from the Tanzanian Forestry and Beekeeping Division and Jacob Kimani from the Department of Resource Surveys and Remote Sensing, Kenya present information on REDD activities in Uganda, Tanzania and Kenya respectively.



From left to right: Rahima Njaidi of the Community Forest Conservation Network in Tanzania, Mwajuma Abdi of Forest Action Network (FAN) in Kenya and Brenda Mwebaze from Uganda Network for Collaborative Forest Associations (UNETCOFA) present on REDD issues relevant to their respective networks.

Why we need more incentives to maintain forest cover on village land.

Irreversible loss of high biodiversity forest in the East Usambara Mountains.

Jaclyn Hall, University of Florida.

The Eastern Arc is one of the most important biodiversity hotspots in the world, and the East Usambara Mountains may have the most diverse forests of the Eastern Arc. Home to the famed Amani rain forest, and some of the highest densities of endemic species, the East Usambaras are high on the list of conservation priorities in Tanzania and worldwide. In the East Usambaras rainfall amounts can exceed 2000 mm per year, natural forest rises between 40 and 55 m in height, and trees can be over 2 m in diameter. Forest regenerates quickly after a mild or moderate disturbance, with height, number, and richness of trees increasing rapidly in degraded forests that have recently been conserved (Hall et al. In review).

Much of the East Usambara forest is protected within a number of Central Government Protective Forest Reserves and the Amani and Nilo Nature Reserves. Of the 63,961 ha of natural forest in the East Usambaras in 1975, 46% had been cleared by the year 2006. The rate of forest loss is increasing, at an average of 0.6% per year after 1975, to an average loss of 3.8% per year currently (see Table 1).

Once unprotected forests have been eliminated from the landscape, protected forests may be increasingly under threat. Connectivity of the major forest blocks has been decreasing rapidly (see figure 1). The forest reserves are becoming completely isolated from each other, and will soon be ecological islands, having lost the connectivity

Eastern Arc Forest Lost				
	Area	area lost	% Lost	% year
1975	63,961			
1992	55,930	2787	10.47	0.62
2000	45,197	2115	8.87	1.11
2006	34,560	4524	20.82	3.47

Tabe 1 Forest change data for the East Usambara landscape using Landsat and SPOT satellite image based classification.

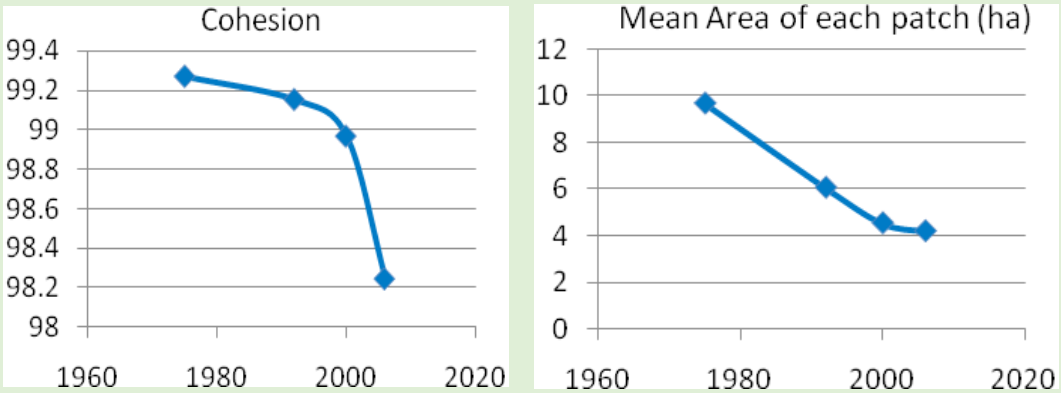


Figure 1 Fragmentation analysis of the East Usambara forest landscape from 1975 to 2006. Cohesion is connectivity between large patches of core forest area.

that is important in maintaining the rich biodiversity of the region. When the forest outside of the reserves is eliminated, will degradation and disturbance activities encroach on the reserves?

The Eastern Arc forests are very important for the global ecological service of carbon storage. These old forests can contain over 400 tons of carbon per ha (Hall, J. unpublished data). One large indigenous tree can contain 103 tons of carbon. Since 1992, 21,370 ha of forest has been lost in the East Usambara Mountains and an estimated 3.7 million tons of carbon has been released from the trees alone (not including release from leaf litter / soil). Much of the unprotected forest has been managed as cardamom farms. Although cleared beneath, traditional agroforests (having indigenous species in the canopy) hold an impressive amount of carbon, averaging 214 tons live carbon per hectare (Hall, J. unpublished data).

The REDD mechanism, if implemented successfully, could give rural farmers in the East Usambaras financial backing from the international community to encourage the conservation and expansion of high carbon stock forests. In the East Usambaras clearly the high carbon stock forest is the natural forest and traditional cardamom agroforestry (with indigenous trees in overstorey).

Communities rely on many products from forested land, including nuts, fruits, poles and vines for building shelter. However, local farmers in the East Usambaras currently find little short term financial value in standing native trees. The native trees have so little value that 21% of forest area was lost between 1992 and 2000. Crops of choice for recently deforested land include sugar cane and clove. Hopefully a successfully implemented REDD project would give financial encouragement for new conservation areas in important forest corridor locations, and promote the expansion of either conserved forest or traditional cardamom agroforests on other deforested areas of the landscape.

Land cover change

The figures and statistics presented represent only change in the natural forest class over time. Satellite image analysis clearly shows the rapid clearing of tropical forest outside of the reserves, and in some cases, within the reserves boundaries. Land cover classifications were produced using a hybrid supervised classification and rule-based approach. The following images were used: Landsat MSS July 27, 1975; Landsat TM June 4,1992; SPOT Jan 17, 2000; Landsat ETM+ Feb. 23, 2006; SPOT Feb 17, 2007. Nine land covers were recognized: natural forest, eucalyptus, teak, tea, thicket, bushes/fallow, water, grass, and bare; and change analysis was performed for the natural forest class only. All of these images were from the dry season, when specific agricultural plots cannot be distinguished from weedy fallow or bushland in the SPOT or Landsat images.

Forest loss on land adjoining the Amani Nature Reserve. Photo by Jaclyn Hall.

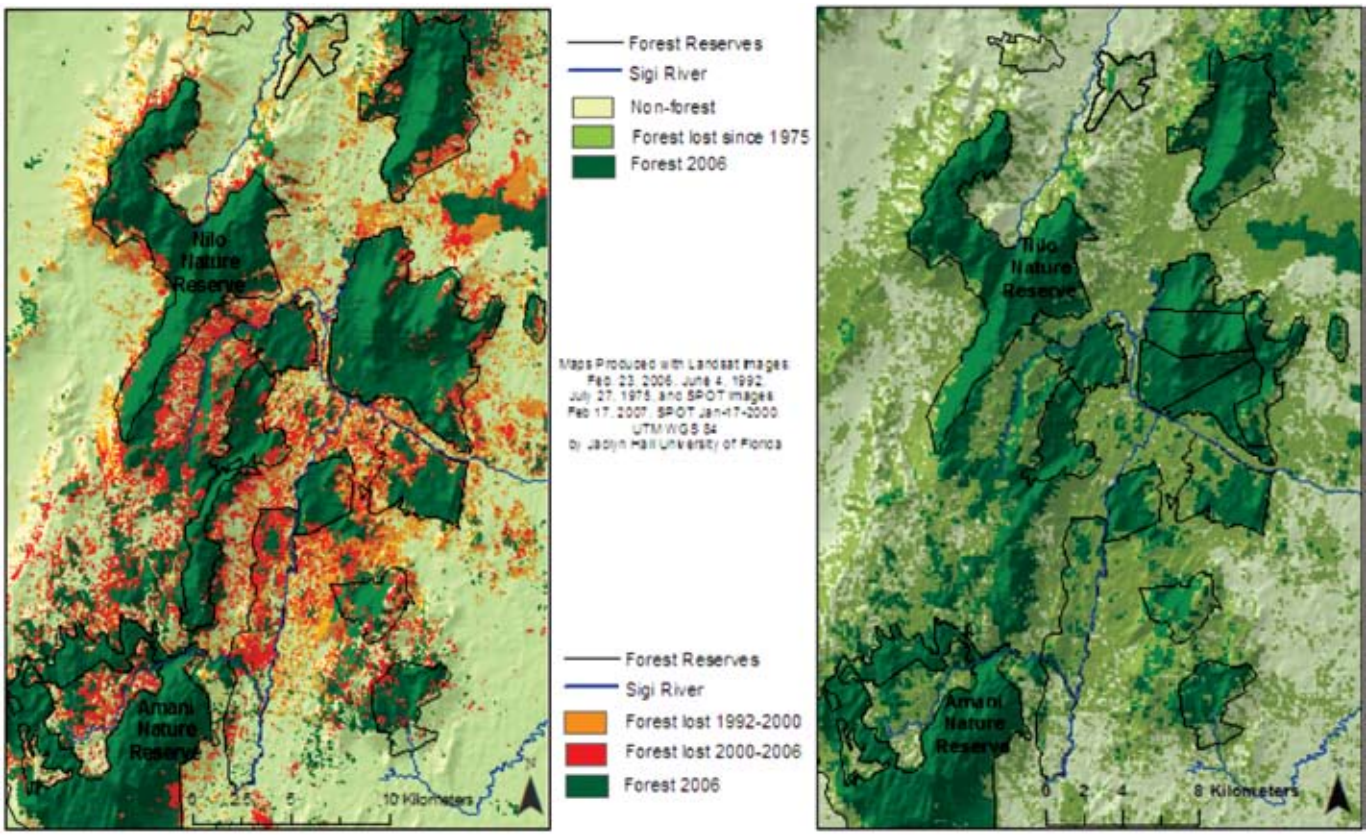
Recently cleared cardamom forest. The owner used a chain saw to clear the land and is planning on leasing the land to others to farm. Photo by Jaclyn Hall.

Deforestation, the complete transition of an area of forest to non-forest, can be detected using Landsat satellite images, which are available from the mid-1970's to present day. Areas of degradation can be identified in many forest types by integrating forest plot information with satellite data. However, in the highest density Eastern Arc forests degradation may be difficult to identify with Landsat, but other higher resolution data, such as SPOT 5, may contribute to identifying degradation. Continued forest surveys not only in permanent plots, but also randomly located plots in all forest habitat will provide a greater understanding for forest carbon stocks and sequestration and degradation processes. This data will also provide valuable species composition information.

The current United Nations Framework Convention on Climate Change (UNFCCC) definition of forest contrasts sharply with the general ecological understanding of the East Usambaras and other Eastern Arc mountains. The forest classifications were created to describe the distribution of Eastern Arc forest in the East Usambaras for the basis of providing a greater ecological understanding of recent land cover change processes. The definition of forest used was > 50% cover of natural growing trees of the Eastern Arc or Zanzibar-Inhambane Coastal Forest Mosaic ecoregions (which grow much higher than 2 m and therefore height was not a consideration). The classification for this study was *not* created using the UNFCCC forest definition of 10 % cover > 2 m, which does not describe naturally growing forest in a meaningful manner in this biodiversity hotspot. It is difficult to classify shrubby weedy third-year fallow and 50 m tall endemic rich Eastern Arc forest under one definition.

Teak and eucalyptus were classified separately and are not represented in the forest change analysis. These plantations do have trees but they are a stark contrast to the Eastern Arc forest in many respects. Eucalyptus is harvested every six years and burned in tea driers and is neither a carbon sink nor a habitat for native species. The Longuza teak plantation has reached 50 years in age and is currently being harvested extensively. The ecological impact of the logging operations, in terms of damage to bordering native forest and impacts of large logging equipment and pull skid trails, etc., should be determined.

Forest Loss in the East Usambaras



Unprotected Coastal Forests in Kilwa and Lindi – a last and urgent opportunity to enhance the protected area network in this region

Neil Burgess, Philip Clarke, Isaac Malugu, Peter Sumbi, Charles Leonard, Nike Doggart, Jonathan Green & Andrew Perkin

View over the Noto Plateau forest. Photo by Andrew Perkin

The Eastern African (Swahilian) Coastal Forests are a well known centre of endemism for plants and animals, containing more than 30 species of animals, 1,750 species of plants, and 27 genera of plants known only from these forest habitats. This is compared to only a few endemic species in the surrounding woodlands and other vegetation types. Coastal Forests occur in lowland areas near the eastern African seaboard from southern Somalia to southern Mozambique, and have recently been recognized to be one of the world's biodiversity 'hotspots'.

Very little Coastal Forest now remains, and the latest estimate derived from satellite images was 6,725 km^2 of forest remaining in 1990, with around 388 km^2 being lost over the next decade to year 2000, and more being lost since then. The majority of the forest in Kenya and Tanzania is now found within reserved lands managed by central, local or village governments. In total the reserve estate in Tanzania covers some 231,585 ha of land under protection and 959,895 ha that is managed for production, within a number of different ownership regimes (Table 1).

Table 1. Number and area of Forest Reserves at national, local authority and village levels of ownership in the coastal regions of Tanzania

Regions	National FR	Local Authority FR	Village FR	Proposed FR	Productive reserves (ha)	Protective reserves (ha)
Pwani (Coast)	46	4	23	2	302,841.7	64,324.7
Dar es Salaam	13	0	0	0	0.0	4,503.9
Lindi	27	3	62	5	542,042.6	82,455.5
Mtwara	5	8	0	6	56,356.6	17,812.2
Tanga	55	5	133	1	58,654.8	62,488.7
Totals	**146**	**20**	**219**	**14**	**959,895.7**	**231,585.0**

Recent work to develop detailed maps of the remaining Coastal Forests of Tanzania, funded by the Critical Ecosystem Partnership Fund, together with an earlier study by OrnisConsult in Denmark have identified significant areas of unprotected Coastal Forest in Kilwa and Lindi Districts of Lindi Region. Some of these forests were visited by scientists for the first time in 2008, using funding provided by the Global Environment Facility, and these preliminary surveys suggest that these forests are very important refuges for rare species.

This short paper presents summary information on these forests, and some preliminary estimations of their conservation value. It also outlines the importance of bringing these areas into the conservation estate within the region, either at the level of village land forest reserve, or some other relevant designation.

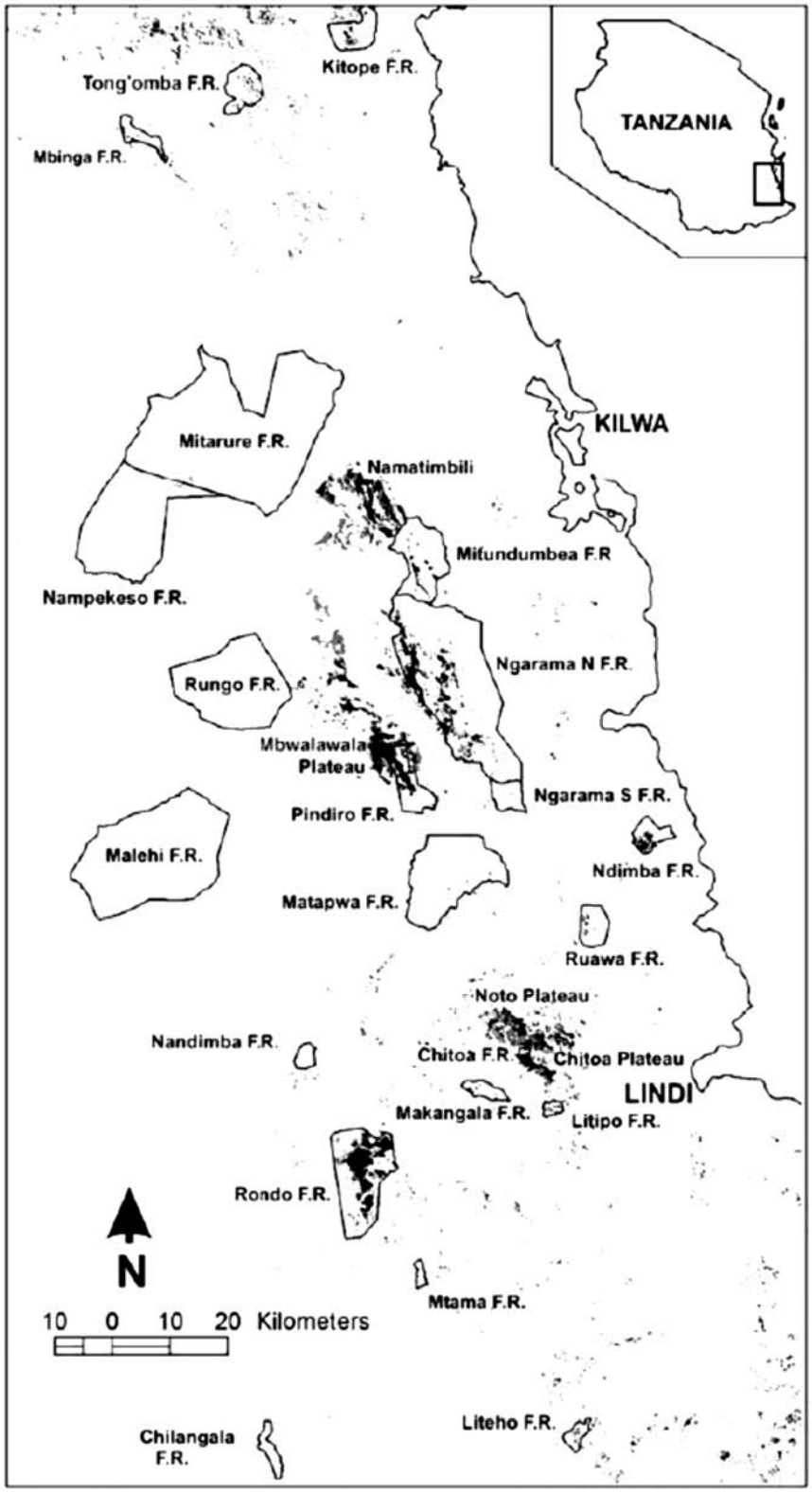


Figure 1. Location of forest and reserves in southern Tanzania, showing the unprotected forests around Uchungwa / Namateule (labeled Namatimbili), on the Mbarawala / Mbwalawala Plateau and on the Noto and Chitoa Plateaux

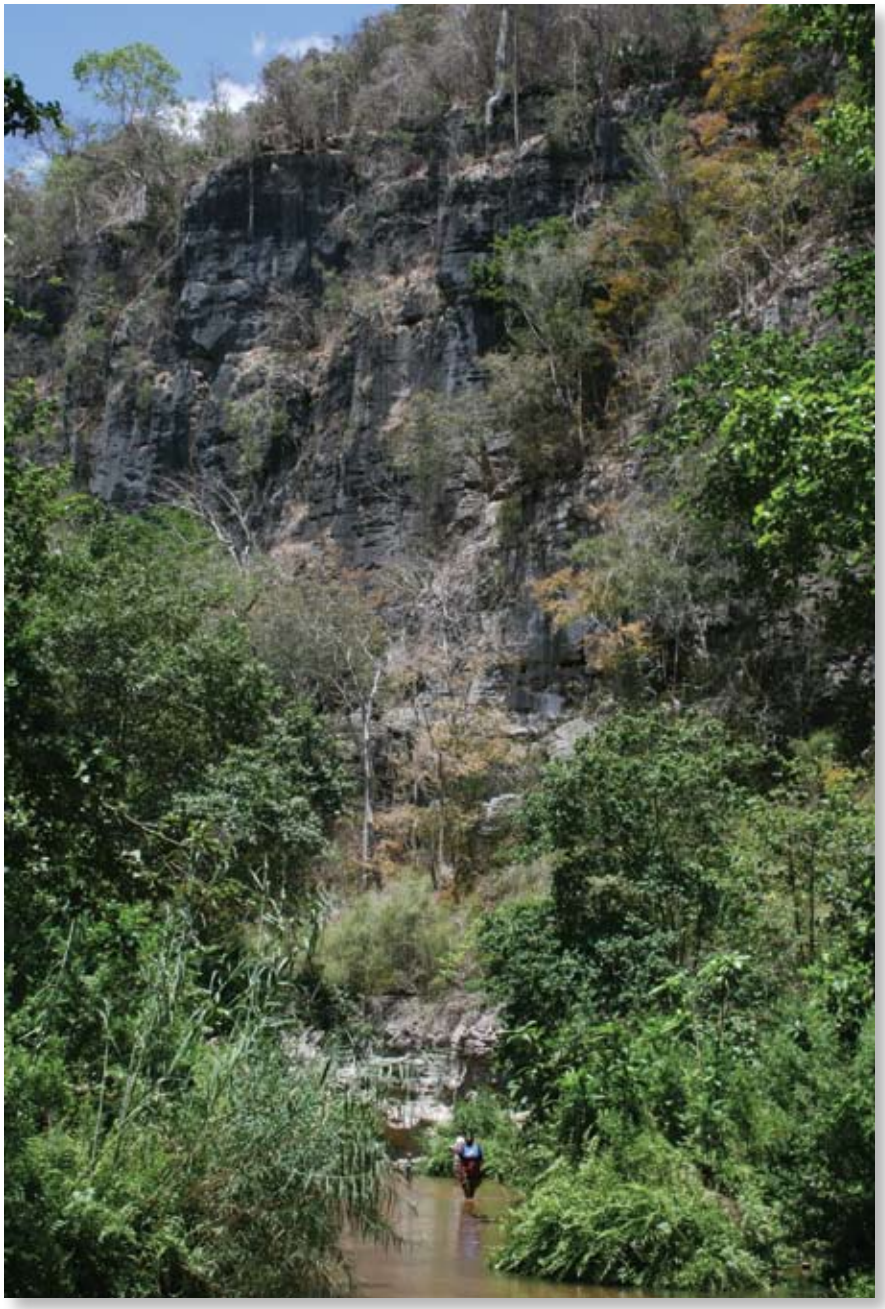
Unprotected Coastal Forests in Kilwa District

Mbarawala Plateau and Uchungwa Forest

The Mbarawala plateau (labeled Mbwalawala in Figure 1) (Figure 1) is partly protected by the Pindiro FR in the south. However, significant areas of various Coastal Forest types (around 75 km2 of scrub forest and 5 km2 of mixed dry forest) occur outside this reserve to the north and north-west. This mosaic of scrub forest with patches of dry forest appears to be similar to that in Ngarama FR to the east.

At the northern end of the Ruwara Plateau is the Uchungwa forest, which is also known as Namateule or Namatimbili (Figure 1, Figure 2). This forest is divided from the neighbouring Mitundumbea FR by the Mavuji river which has cut a dramatic gorge (Rudadonga gorge) through outcropping limestone. The Uchungwa / Namatimbili forest remains largely unsurveyed and ungazetted but remote sensing indicates significant areas of various Coastal Forest types including ca. 29 km^2 of scrub forest and ca. 34 km^2 of mixed dry forest.

A mosaic of different types of dry forest is found, generally in pristine condition. The limestone area contains a unique type of dry forest including high densities of the cycad *Encephalartos hildebrandtii*. This area is dominated by the Lindi region endemic trees *Cynometra filifera* and *Cynometra gillmannii.* There is also a little disturbed and well developed band (ca. 3 km^2) of riverine forest along the gorge of the Mavuji and Liwiti Rivers (Figure 2).



The Mavuji Gorge. Photo by Andrew Perkin

Further botanical collecting in the area may discover African Violets in the Rudadonga gorge system (Figure 2), given its similarity to the now deforested limestone gorges at Tanga where the genus *Saintpaulia* was first collected, as well as the proximity to the African Violet populations in the Kiwengoma forest in the nearby Matumbi Hills. There are also at least two species of plants that as yet have no formal scientific name in the Uchungwa forest - *Pterygota* sp. nov. and *Trichilia* sp. nov.

The Mbarawala plateau and Uchungwa forests are home to six coastal forest endemic vertebrate and eleven near endemic vertebrate species, seven of which are considered threatened. Of the endemic and near-endemic mammal fauna Grant's galago (*Galagoides granti*), the lesser pouched rat (*Beamys hindei*) and the Chequered elephant shrew (*Rhynchocyon cirnei macrurus*) occur. An isolated and vocally distinct population of bush hyrax (*Heterohyrax sp*) is found in the limestone areas of Uchungwa. Large and mobile mammal species include

populations of hippo (*Hippopotamus amphibius*), elephant (*Loxodonta africana*), hyena (*Crocuta crocuta*), lion (*Panthera leo*), African wild dog (*Lycaon pictus*) and leopard (*Panthera pardus*). The seasonal movements of these animals are not fully understood but the connectivity with the surrounding woodland areas and the eastern Selous Game Reserve is also likely to be ecologically important for these species.

The Mbarawala plateau and Uchungwa forests are also an important area for coastal forest birds containing populations of Plain-backed sunbird (*Anthreptes reichenowi*), and Southern-banded snake eagle (*Circaetus fasciolatus*). Other forest dependent species present in the landscape include African Broadbill (*Smithornis capensis*), Tiny Greenbul (*Phyllastrephus debilis*) and Yellow-streaked Greenbul (*P. flavostriatus*). The near endemic subspecies, the Woodward's Green Barbet (*Stractolaema olivacea spp. woodwardi*) and Reichenow's Batis (*Batis mixta reichenowi*) also occur.

It is believed that these larger blocks of forest south of the Rufiji River have survived as a consequence of the historical depopulation and isolation of this area, which has limited agricultural clearance and development. The area inland of Kilwa was massively depopulated following raids by the marauding Zimba tribe during the 16th Century. More recently, the German colonial authority exacted harsh retribution in reprisal for the 1905-1906 'maji-maji' uprising that started in the Matumbi Hills, and led to the massive depopulation of the area south to Lindi. Ujamaa concentrated the surviving people so that large areas remained remote and isolated until recent times.

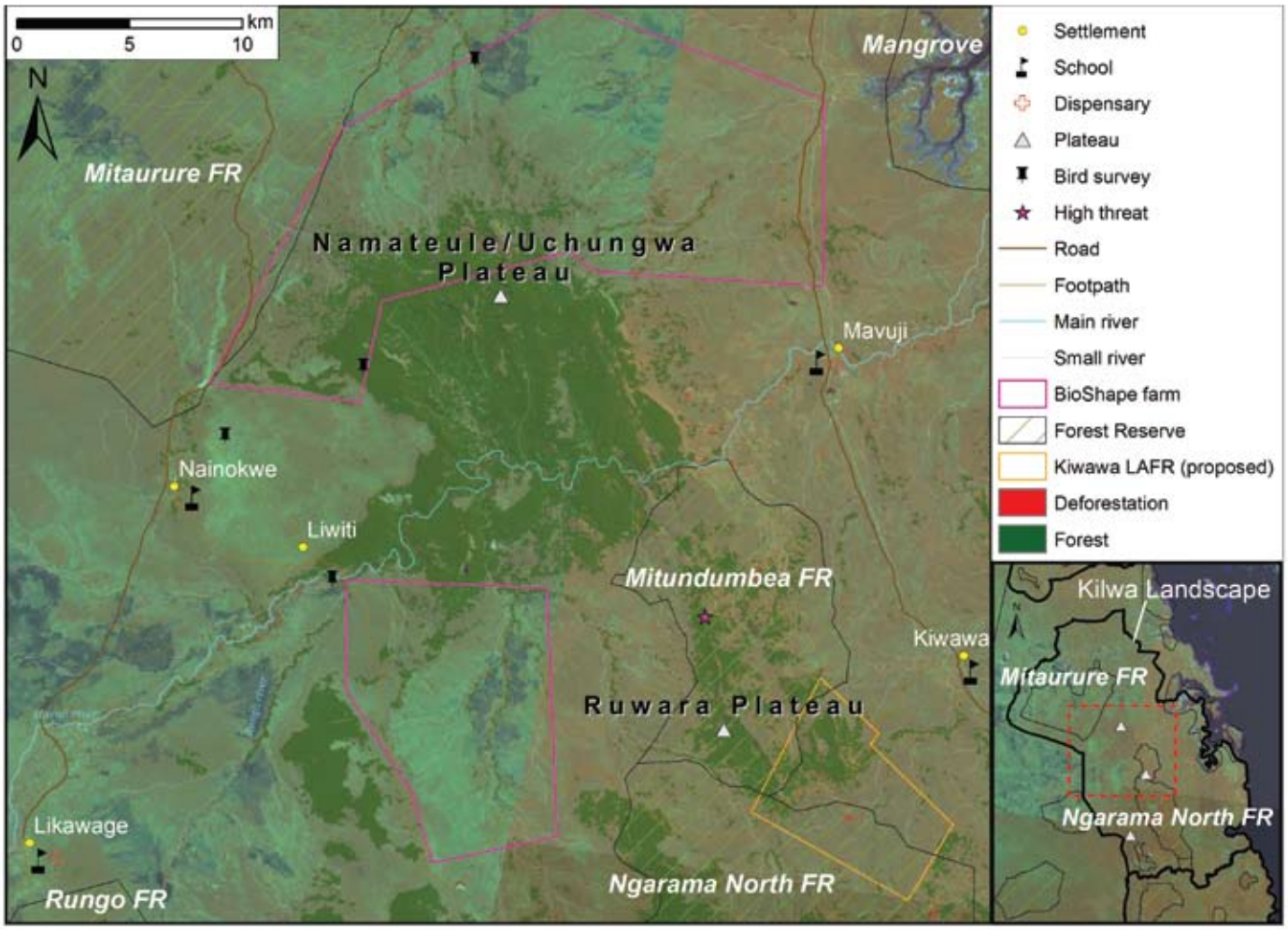


Figure 2. Forest habitats (green) in the Kilwa landscape, showing the location of Forest Reserves and the boundaries of the BioShape biofuel farming concessions described in the conservation section below (pink). The Maviji river is clearly visible in the south of the Uchungwa forest block. The main limestone block that forms a unique forested Karst landscape, runs from the Mavuji River north to Uchungwa peak. South of the Mavuji river after less than a kilometer the limestone gives way to other rock types.

The construction of the Mkapa bridge across the Rufiji River and the upgrading of the Dar es Salaam to Lindi road has now opened up the area south of the Rufiji to development. The Matumbi Hills, to the north of Tong'omba FR (Figure 1), an area with fertile soils, is now intensively farmed and little forest remains outside the gazetted reserves. The hills to the immediate south, on the Mbwalawala and Ruwawa plateaux may soon be targeted for agricultural clearance. It is on these hills that the Coastal Forests of interest are located.

Unprotected Coastal Forests in Lindi District

Noto plateau

The Noto Plateau (Figure 1, Figure 3) is predominantly covered by dry evergreen forest, with a well-developed canopy at 12 m and emergent trees to 20 m. Dominant canopy species recorded in 2008 include *Pteleopsis myrtifolia*, *Afzelia quanzensis*, *Zanthoxylum deremense*

Figure 3. Map of the Lindi Landscape showing the location of the Noto Plateau and the various unprotected forest patches (dark green) that are found there and around the Chitoa Forest Reserve (black). Full surveys of the Noto plateau and other surrounding forests, many of which have never been visited, will reveal more biological information which at this stage is still incomplete.

and *Grewia conocarpa*. In the understorey the dominant species include *Annona senegalensis*, *Tabernaemontana elegans*, *Strychnos* sp., *Xylotheca tetensis Carvalhoa campanulata*, *Erythrococca fischeri* and *Cyathula* sp. This area is believed to have been extensively logged in the past. The forest differs from the adjacent Chitoa plateau (Figure 1) in having few *Scorodophloeus fischeri* or *Milicia excelsa* trees. Three Coastal Forest endemic plant species are known from the Noto forest, but have not been recollected since they were discovered during the 1930s.

A short rapid survey of the Noto plateau forests revealed five near endemic and five threatened vertebrate species, including Grant's galago (*Galagoides granti*), the lesser pouched rat (*Beamys hindei)* and the Chequered elephant shrew (*Rhynchocyon cirnei macrurus*), as well as the bird species East Coast Akalat (*Sheppardia gunningi*) (also in Ruawa), Plain backed sunbird (*Anthreptes reichenowi*), and Southern-banded snake eagle (*Circaetus fasciolatus*). Other forest dependent species include African Broadbill (*Smithornis capensis),* Tiny Greenbul (*Phyllastrephus debilis*), Yellow-streaked Greenbul (*P. flavostriatus*), and the near endemic subspecies, the Woodward's Green Barbet (*Stractolaema olivacea* spp. *woodwardi*) and Reichenow's Batis (*Batis mixta reichenowi).* Elephant and buffalo were also recorded in the area, moving through the forest in small numbers when water sources, mostly at the bases of the escarpments become seasonally available. This sometimes leads to human wildlife conflict since the local communities also use the same water sources.

Conservation needs

The Kilwa Landscape contains two large blocks of Coastal Forest on the Mbarawala Plateau and at Uchungwa, neither of which is under any form of legal protection. These forests need to be protected. In the past few years large areas of previously uncultivated land have been allocated to concessions for plantations, including the northern part of the Uchungwa forest which is now owned by the Tanzania Investment Centre on behalf of the Dutch bio-fuel company BioShape Holdings B.V (see Figure 2 for boundaries). It is suggested that some of the forest area within the Bioshape concession area should be transferred to conservation management.

In the Lindi Landscape there are significant forest patches that are unprotected on the Noto and Chitoa plateaux (Figure 3). The Noto plateau contains the largest and most important block of forest without any protection status. This area of forest, coastal woodlands, regenerating forest and thicket stretches to the Chitoa plateau as well as into valleys in the East and North of Noto. These forest areas need protection and there is considerable scope for the establishment of Village Land Forest Reserves (VLFRs) and a landscape conservation plan.

In conclusion, in both these landscapes areas there is a need to more fully assess the extent, biological values and local use of the unprotected Coastal Forest patches. There is also a need to more fully discuss the status of the forest in the Kilwa Landscape that is within the concession areas of the biofuel company 'Bioshape' and the possibility to save some of the important forest areas for conservation, perhaps by including them within an extension of the existing Forest Reserves in the area.

Clearance of a rare stand of Tessmannia densiflora a tree endemic to the Kichi and Matumbi Hills of Tanzania. November 2009. Photo by Quentin Luke.

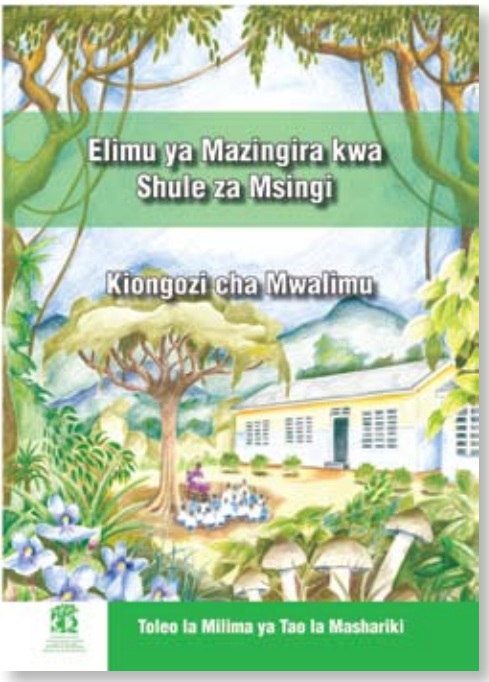
TFCG News

Did you know?

TFCG has five programmes: participatory forest management, environmental education and awareness, community development, advocacy and research.
TFCG works with 140 villages in 6 regions around 124,000 ha of forest in the Eastern Arc Mountains and Coastal Forests.
Find out more at www.tfcg.org

TFCG environmental education guide endorsed by Ministry of Education

Many primary schools in the Eastern Arc Mountains do not have environmental education teaching materials. This was one of the issues that was raised by teachers and other stakeholders during a survey carried out by TFCG as part of the Conservation and Management of the Eastern Arc Mountain forests project. To address this TFCG have been developing a teachers guide to Environmental Education. The guide has now been approved by the Ministry of Education and with support from CEPF, 12,000 copies of the guide have been printed. The guide includes 88 lesson plans for teachers based on the Tanzanian National Curriculum. The lesson plans use information about the Eastern Arc Mountains and Coastal Forest hotspot to illustrate the concepts that are being taught.



The artwork includes images of animals and plants characteristic and endemic to the Eastern Arc Mountains as well as cartoons depicting some of the conservation issues and actions that can be taken to improve sustainable environmental management. Dr Kilahama, the Director of the Forestry and Beekeeping Division signed the foreword and with support from Conservation International, TFCG are now distributing the guide to schools across the Eastern Arc Mountains.

Interested to find out more about Tanzania's forests? Visit the Coastal Forest and Eastern Arc Mountain websites.

Working closely with the Eastern Arc Mountains Conservation Endowment Fund and with the Conservation and Management of the Eastern Arc Mountain Forests project, TFCG has been updating the Eastern Arc website (www.easternarc.or.tz). The site provides information about EAMCEF as well as access to hundreds of reports, GIS data files and maps relevant to the Eastern Arc Mountains. Over the last two months an additional 20 reports have been added.

Additional reports have also been added to the TFCG 'Coastal Forest' website http://cf.tfcg.org. The website provides general information about the values of Kenya and Tanzania's coastal forests as well as about the threats that these forests currently face together with information about conservation initiatives past and present. The website also includes profiles of 165 of the major coastal forests with information about the location, vegetation types, biological values and conservation initiatives in that area. Over 100 publications and 89 maps are also available on the site.

Update from the CEPF Coordination Unit

Although almost all projects financed by the Critical Ecosystem Partnership Fund have now been closed, the CEPF Coordination Unit including BirdLife International, ICIPE, TFCG and WWF continue to promote conservation and partnership in the region. The Coordination Unit are currently focusing on fund raising to sustain the gains made with CEPF's 5 year investment.

The CEPF Donor Council have invited an application for consolidation funding for the Eastern Arc Mountains and Coastal Forests of Kenya and Tanzania. The aim of CEPF's consolidation funding programme is to reinforce and sustain

the conservation gains achieved as a result of CEPF investments in the initial 5-year investment period. CEPF are in the process of preparing the application with input from the CEPF Coordination Unit.

Looking for that perfect gift that says you care....

TFCG is pleased to announce the launch of 'Amani Art', a cooperative in the East Usambara Mountains of Tanzania that provides women with the resources, skills and market access they need to be successful craft artisans. Amani Art uses butterfly wings to produce attractive jewellery. The butterflies are farmed by women and men living adjacent to forests in the East Usambara mountains. For the last five years, TFCG's Amani Butterfly project has been providing a steady income to butterfly farmers in the East Usambara Mountains. Recent research has shown that this has resulted in significant positive changes in the way that people in the East Usambara Mountains perceive the forests and has motivated people to participate in the management of the forests. For more information please visit www.amanibutterflyproject.org

Butterfly pendants produced by members of Amani Art. Photo by Theron Morgan-Brown.

Members of the Amani Art group. Photo by: Theron Morgan-Brown

TFCG support communities around Tanzania's 3 new nature reserves

TFCG have been working closely with the Forestry and Beekeeping Division to get Tanzania's three new nature reserves up and running. The Nilo, Kilombero and Uluguru Nature Reserves were formalised in 2007 and 2008. Over the last six months, significant efforts have been made to develop the protected area infrastructure, build the capacity of reserve staff and establish monitoring systems. TFCG have been actively working with the communities around the three new nature reserves to raise awareness about forest conservation, nature reserves, climate change, fire management and sustainable livelihood activities.

Community groups from across Tanzania express support for REDD

MJUMITA (Mtandao wa Jamii wa Usimamizi wa Misitu Tanzania) with support from the Tanzania Forest Conservation Group, the Institute of Resource Assessment (IRA) and IUCN, held its 9th annual workshop and general meeting from 23rd to 25th November 2009 in Tanga. Representatives from more than 75 community forest associations from mainland Tanzania, local and central government representatives, academics and participatory forest management practitioners met to discuss 'Climate change: its driving forces and its effects on community livelihoods and forest management in Tanzania'.

Participants looked at the linkages between Tanzania's forests and climate change both in terms of the role that forests can play in helping people to adapt to the impacts of climate change as well as looking at how we can reduce emissions of greenhouse gases by protecting forests better. During the meeting communities demanded that REDD (Reducing Emissions form Deforestation and forest Degradation) bring real benefits to them not like the empty promises that were made about the benefits that they would receive from previous forest management regimes. Communities also requested more information and training on REDD and that they be given the opportunity to participate fully in the planning, implementation and monitoring of REDD. Communities also insisted that they need more information and training so that they can more effectively address the drivers of deforestation. They also highlighted that if we are to reduce leakage and achieve permanence then more support is needed for income generating activities including improved agriculture.

Communities also insisted that a multi-sectoral approach is needed in dealing with REDD since climate change is a cross-cutting issue affecting agriculture, forestry, land, planning, finance, mining, water, investment and health.

Communities also had the opportunity to contribute towards the development of the National REDD strategy. Some of the issues raised by the communities with regard to the development and implementation of the National REDD Strategy were:

- Alternative income generating activities that are complementary to REDD should be promoted and supported and that the commitment to support these activities should be made explicit in the national REDD strategy.
- MJUMITA is a good avenue for information sharing and awareness raising on REDD initiatives in the Country.
- The land tenure of communities needs to be strengthened and villages need to be supported to develop and implement effective land use plans.
- Environmental committees and groups living adjacent to forests need to be supported to carry out their forest management duties including providing them with the resources and equipment that they need to carry out their work effectively.
- Communities should participate in high level meetings on REDD.

Participants in the 9th MJUMITA annual meeting

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About the Tanzania Forest Conservation Group

The Arc Journal is published by the Tanzania Forest Conservation Group (TFCG). Established in 1985, TFCG is a Tanzanian non-governmental organisation promoting the conservation of Tanzania's high biodiversity forests.

TFCG's Vision

We envisage a world in which Tanzanians and the rest of humanity are enjoying the diverse benefits from well conserved, high biodiversity forests.

TFCG's Mission

The mission of TFCG is to conserve and restore the biodiversity of globally important forests in Tanzania for the benefit of the present and future generations. We will achieve this through capacity building, advocacy, research, community development and protected area management in ways that are sustainable and foster participation, cooperation and partnership.

TFCG supports field based projects promoting participatory forest management, environmental education, community development, advocacy and research in the Eastern Arc Mountains and Coastal Forests. TFCG also supports a community forest conservation network that facilitates linkages between communities involved in participatory forest management. To find out more about TFCG please visit our website www.tfcg.org.

Inside this edition of the Arc Journal

TFCG and MJUMITA launch community REDD project 1
Getting REDDy in Tanzania: principles, preparations and perspectives 3
Need for greater harmonisation of forest carbon monitoring and verification for REDD 7
The United Nations REDD programme in Tanzania 11
Understanding Eastern Arc Mountain ecosystems: perspectives across space and time 15
Community participation in REDD 18
Why we need more incentives to maintain forest cover on village land 20
Unprotected coastal forests in Kilwa and Lindi 23
TFCG news 29

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