# Info Note

# Making trees count in Africa

*Improved MRV is needed to meet Africa's agroforestry ambitions*

*Todd Rosenstock, Andreas Wilkes, Courtney Jallo, Nictor Namoi, Medha Bulusu, Damaris Mboi*

**DECEMBER 2018**

## Key messages

- The UNFCCC's Koronivia Joint Work on Agriculture creates an opening for agroforestry to take on an important role in Africa's response to climate change.

- We reviewed measurement, reporting and verification (MRV) of agroforestry under the United Nations Framework Convention on Climate Change (UNFCCC) by examining national communications, nationally determined contributions (NDCs), REDD+ and Nationally Appropriate Mitigation Actions (NAMAs) in developing countries, including all African nations.

- Support for agroforestry was stronger in Africa than any other region, and many African nations plan to use agroforestry to meet climate goals. However, technical and institutional barriers often prevent agroforestry from being represented in UNFCCC MRV processes.

- The fact that agroforestry often isn't counted in national MRV systems has significant implications. Only if agroforestry resources can be properly measured will countries gain access to sources of finance and other support for agroforestry as a response to climate change.

- Widespread and strong support for agroforestry suggests that, in responding to the Koronivia Joint Work on Agriculture, African nations should emphasize agroforestry as a central strategy in the continent's climate change strategies.

## Koronivia and MRV of agroforestry

The 23rd Conference of the Parties (COP 23) to the United Nations Framework Convention on Climate Change (UNFCCC) reached a decision on agriculture for the first time. Known as the Koronivia Joint Work on Agriculture, the decision will bring greater attention to climate action in the agricultural sector. The decision invites stakeholders to share their views on a range of issues, including methods for assessing adaptation and resilience; improving soil and water management; and improving livestock systems. The decision also invites countries to make the case why attention should be given to topics not explicitly addressed.

Agroforestry—the integration of trees with crops and livestock—is not mentioned explicitly in the decision. However, agroforestry has many benefits directly relevant to the topics addressed, including:

- building resilience by buffering rising temperatures and conserving soil moisture
- increasing soil carbon and improving soil health and fertility
- providing protein-rich fodder as well as shade, thus reducing heat stress and allowing improved and more sustainable livestock production
- diversifying livelihoods by providing additional nutrients and contributing to energy security and economic development

In order for agroforestry contributions to be recognized and rewarded, however, countries need reliable systems for measurement, reporting and verification (MRV) of agroforestry.

Increasingly effective national MRV systems are gradually being put in place, but progress has been more limited for agroforestry than for other agricultural systems such as crop and livestock production. Parties to the UNFCCC have agreed to submit national greenhouse gas (GHG) inventories that include sources of emissions and removals. In creating these inventories, the significance of agroforestry and trees outside forests (ToF) is often neglected. If agroforestry and ToF remain uncounted, their contribution to countries' nationally determined contributions (NDCs) will not be properly recognized.

*Figure 1. Leguminous trees improve soil fertility and provide a nutrient rich source of fodder for livestock. This woman at a market in Rwanda is holding fodder. Photo credit: ICRAF.*



**Koronivia Joint Work on Agriculture**
*In November 2017 the UNFCCC announced it would address agriculture and invited stakeholders to submit their views on issues to be considered, "starting with but not limited to" the following:*

*(a) Modalities for implementation of the outcomes of the five in-session workshops on issues related to agriculture and other future topics that may arise from this work;*

*(b) Methods and approaches for assessing adaptation, adaptation co-benefits and resilience;*

*(c) Improved soil carbon, soil health and soil fertility under grassland and cropland as well as integrated systems, including water management;*

*(d) Improved nutrient use and manure management towards sustainable and resilient agricultural systems;*

*(e) Improved livestock management systems;*

*(f) Socioeconomic and food security dimensions of climate change in the agricultural sector.*

*Source:*
*https://unfccc.int/files/meetings/bonn_nov_2017/application/pdf/cp23_auv_agri.pdf*

## Objective

Our key goal was to understand the ability of countries to monitor and report agroforestry practices. In partnership with CCAFS and USAID, ICRAF assessed the visibility of agroforestry in MRV systems under the UNFCC by examining national communications (NCs), NDCs, Reducing Emissions from Deforestation and Degradation (REDD+) strategies and Nationally Appropriate Mitigation Actions (NAMAs), including all submissions by African countries. Countries' interest in agroforestry as a climate response measure was evaluated by explicit references to agroforestry in the documents, as well as by mentions of related topics (such as woodfuel). Countries' integration of agroforestry in MRV was assessed from descriptions of methods and the results presented. This info note highlights the results of this study as they pertain to the countries in Africa.

## Africa's ambition

The study found that support for agroforestry was stronger in Africa than anywhere else in the world. Globally, out of 148 developing countries' NDCs, 59 (40%) explicitly mention agroforestry as a strategy for climate change mitigation and adaptation. But this interest was especially strong in Africa, where 71% of countries explicitly mention agroforestry in their NDCs. Of these, 21 countries' NDCs emphasize agroforestry benefits for adaptation, and 21 for mitigation, but most recognize its contribution to both. Of 30 African countries engaged in REDD+, 17 have explicitly mentioned agroforestry outside forests as a response measure to the drivers of deforestation and forest degradation. Three of the six agricultural NAMAs proposed or under development by African countries involve agroforestry (Kenya, Rwanda and Uganda). (See Figure 2.)
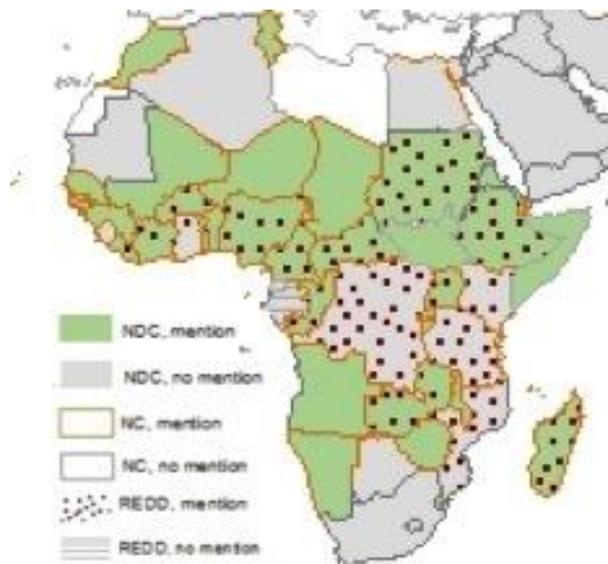


*Figure 2. National ambitions to use agroforestry as a solution to climate change and development in Africa.*

This strong support for agroforestry suggests that, in responding to the Koronivia Joint Work on Agriculture, African nations should emphasize agroforestry as a central strategy in the continent's response to climate change.

Despite African countries' strong policy interest in agroforestry and ToF, often such trees are not counted within existing MRV systems. Most African countries' GHG inventories report removals in the land use change and forestry (LUCF) sector. However, only about 45% of African countries' GHG inventories report any sub-categories of land use or land-use change within the LUCF sector. In particular, very few inventories report on specific sub-categories of land-use change relating to agroforestry.

This means that, although the LUCF sector's contribution to national emissions and removals is communicated to policymakers or the international community, the specific contribution of different forms of land use—including agroforestry or other forms of ToF—is often not. The lack of sub-category reporting may be due to the way inventories are summarized in national communications, suggesting that where data exists, increased transparency in inventory reporting could increase the visibility of agroforestry. In other cases, the lack of data on sub-categories is likely to reflect definitional, institutional and technical challenges and may mean the contribution of the LUCF sector could be underestimated because ToFs are not included. Exclusion of sinks and sources is an additional, rarely documented, source of uncertainty in GHG inventories.

## Challenges for MRV of agroforestry

In many countries' inventories, quantification of the LUCF sector focuses on forest area and forest carbon stock changes. Forest definitions have a direct impact on what is and is not included in MRV systems. National forest inventories are one key input into national GHG inventories. However, only 26% of African countries (15 out of 58 countries and territories reported in FAO's Forest Resource Assessment 2015) include trees on non-forest land in their national forest inventories.

Agroforestry and ToF are also often excluded from carbon accounting in the national REDD+ forest carbon baseline (i.e., Forest Reference Emission Level/Forest Reference Level, or FREL/FRL). REDD+ is designed to reduce deforestation and forest degradation, although some countries include some forms of agroforestry but not others. Uganda, for example, excludes trees that are part of agricultural production, such as fruit plantations and other agroforestry systems, while Ghana excludes cocoa, citrus, oil palm and rubber. Yet agroforestry is often explicitly identified as a response measure in REDD+ strategies. Excluding agroforestry from

FRELs/FRLs makes it difficult to account for and incentivize changes in carbon stocks due to agroforestry or ToF as part of REDD+ action. There are solutions, however, as indicated by the experience of Ghana with its cocoa and *Shea* programmes (see box below).

There are also institutional barriers to successful MRV of agroforestry. Continual improvement in MRV capacities depends on appropriate institutional arrangements, institutional coordination and the adopting robust guidance for compiling inventories, continually improving them, and ensuring quality control. Many African countries have not yet established permanent units to manage inventory and other MRV processes. And institutional arrangements for coordinating GHG inventories and MRV of REDD+, and for coordinating with the forestry and agriculture sectors, are still under development. The lack of well-defined institutional arrangements often hinders regularizing MRV procedures and sustainable capacity development.

---

*Tree crops and forests in Ghana*
*Ghana's REDD+ Strategy identified expansion of cocoa and other tree crops as a key driver of forest degradation and deforestation. The country has proposed large-scale sub-national programmes focusing on the main cocoa and shea producing regions. The Cocoa Forest REDD+ Programme (GCFRP) and the Shea Savanna Woodland Programme are to be supported from different sources of climate finance. Each programme has proposed a distinct MRV system that links with UNFCCC-related national MRV systems while also meeting the MRV requirements of each funding source. The design of the GCFRP is more advanced than for the shea programme, and illustrates a general approach that could be applied to multiple sub-national agroforestry programmes.*

*For the GCFRP, the FCPF Carbon Fund will pay for emission reductions verified in accordance with the methodological framework of the fund. A forest reference level for the programme area, consistent with the national REDD+ FRL, has been defined following the national forest definition, which excludes tree crops such as cocoa but includes timber plantation species. The programme MRV system proposes to use high-resolution (Landsat 8) imagery to detect and report forest cover change every two years, with specific monitoring methods proposed for tracking the key drivers (e.g., illegal logging and timber harvest, fuel-wood collection and fire). Within the cocoa landscape, increasing shade trees is one climate-smart option. Individual projects embedded in the GCFRP are investigating the potential for using carbon-market methodologies to value the carbon increment in the cocoa landscape.*

Integrating agroforestry in MRV systems is also complicated by additional coordination needs due to the ill-defined institutional boundaries or mandates. Since it is not defined as forest, agroforestry generally falls outside of the mandate of forestry ministries. Forestry ministries focus their financial and human resources on monitoring lands that meet the nation's definition of forest. Where agroforestry falls under the control of agricultural agencies, these generally have little capacity—and sometimes little interest—in measuring and monitoring trees. In Ethiopia, for example, agroforestry programmes implemented in the agriculture sector have had to convene dedicated training programmes to equip extension staff at different levels with skills in tree measurement.

On the technical side, the biggest challenge is limited availability and capacity to use remote-sensing technologies. In areas where satellite images show that trees meet specified criteria (e.g., for patch size or crown cover), agroforestry may be included in analysis along with other forms of forest. Where vegetation map layers are overlaid on land-use maps, trees or shrubs outside administratively defined forests (e.g., on croplands or in settlements) may be a clearly distinguishable category of tree cover.

## Way forward

Some countries reported that the use of higher-resolution satellite imagery has improved their ability to identify trees that are growing in small patches or scattered across the landscape. Although such imaging shows great promise, cost is a significant barrier, especially given that it is necessary to buy a series of images from different time periods in order to document how the carbon stock is changing. Namibia's NC notes the barrier posed by the high cost of these images, which was confirmed in several interviews with inventory experts in other African countries. As a result, there is a lack of data on both baseline carbon stocks and changes in carbon stock under different agroforestry systems. Furthermore, countries often lack the technical capacity to process imagery. For example, in the Democratic Republic of Congo, the remote sensing expertise rests with NGOs rather than with the government. This condition leads to "outsourcing" of measurement and reporting. While capacities for remote sensing of forest area and forest inventories have improved in some African countries, agroforestry and ToF are rarely the focus of capacity building efforts. Increased funding for capacity development and improved access to high-resolution imagery would improve the ability of developing countries to accurately detect change in trees outside forests.

At the national level, the ministries involved in climate action and MRV must become more aware of the relevance of agroforestry to achieving climate,

environmental and development priorities. Ministries with mandates for climate change, forestry, agroforestry and agriculture must coordinate to ensure that agroforestry does not fall through the cracks. Strengthening national institutional mandates to promote agroforestry is a clear opportunity to achieve this. A better understanding of the specific challenges faced in including agroforestry in MRV systems can assist in developing strategies to ensure that its contribution is better recognized. This is likely to require stronger coordination among national agencies involved in MRV to increase the visibility of data on agroforestry in both sectoral (e.g., forestry and agriculture) and national MRV systems.

Emerging programmatic and policy initiatives, such as climate-smart agriculture and the Bonn Challenge for land restoration also provide an opportunity to integrate agroforestry in national actions on the environment and climate change. This will require the development of practical monitoring and evaluation systems to track progress in delivering on plans, including agroforestry, and their outcomes and impacts for resilience, with mitigation as a co-benefit. Piloting MRV systems for agroforestry programmes (such as those described in the text box on Ghana) would provide experience of how to capture the benefits of agroforestry in MRV systems, experience that could be integrated into national MRV systems when the proof of concept for the policy benefits of better MRV are clear.

At the regional level, there is a need for greater sharing of experience and capacity-building on agroforestry and other forms of ToF in both national forest and GHG inventories. Regional and international organisations supporting MRV capacity-building should recognize the significance attached to agroforestry in African countries' climate change strategies, and convene experience-sharing and capacity-building on the topic. In particular, regional and international organisations should:

- Continue to strengthen technical capacities to provide consistent representation of land, including trees outside forests, in national inventories;

- Increase access to Africa-specific data for carbon quantification of agroforestry to support MRV of mitigation co-benefits;

- Assist in scaling project- and programme-level MRV of agroforestry to national MRV systems;

- Continue capacity-building on creating sustainable GHG inventories, and coordination between the different MRV systems in the UNFCCC; and

- Give a prominent profile to agroforestry in the implementation of the Koronovia Joint Work Plan.

The fact that agroforestry often isn't counted in national MRV systems has serious implications. Only if

agroforestry resources can be properly measured will they gain access to sources of finance and other support, and thereby assume a prominent role as a response to climate change. In Africa, the situation requires responses at the country and regional levels.

## Further reading

- Dinesh D et al. (eds). 2017. 10 best bet innovations for adaptation in agriculture. CCAFS Working Paper no. 215. Wageningen, The Netherlands: CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS). https://cgspace.cgiar.org/bitstream/handle/10568/89192/CCAFSWP215.pdf

- Duguma LA et al. 2017. How agroforestry propels achievement of nationally determined contributions. ICRAF Policy Brief no. 34. Nairobi, Kenya: World Agroforestry Centre. http://www.worldagroforestry.org/downloads/Publications/PDFS/PB17360.pdf

- Schnell S, Kleine C, Ståhl G. 2015. Monitoring trees outside forests: a review. *Environmental Monitoring and Assessment,* 187:600. http://doi.org/10.1007/s10661-015-4817-7

- Tulyasuwan N, Henry M, Secrieru M, Jonckheere I, Federici S. 2014. Issues and challenges for the national system for greenhouse gas inventory in the context of REDD+. *Greenhouse Gas Measurement and Management,* 73-83. https://doi.org/10.1080/20430779.2012.716298

- Zomer RJ, Neufeldt H, Xu J, Ahrends A, Bossio D, Trabucco A, van Noordwijk M, Wang M. 2016. Global tree cover and biomass carbon on agricultural land: The contribution of agroforestry to global and national carbon budgets. *Scientific Reports*. http://doi.org/0.1038/srep29987

*Todd Rosenstock (t.rosenstock@cgiar.org)is an agroecologist and environmental scientist with the World Agroforestry Centre (ICRAF) based in Kinshasa, Democratic Republic of the Congo. Andreas Wilkes is Director of Values for Development Ltd., a UK-based consulting company. Courtney Jallo works in agricultural development programming that improves livelihoods while preserving and enhancing ecological systems and community health. Nictor Namoi is a Research Fellow at the ICRAF in Nairobi, Kenya. Medha Bulusu is a recent graduate with a Master of Science in Earth System Science from the University of Hohenheim, Germany. Damaris Mboi is a research assistant in the Land Health Decisions Theme at ICRAF in Nairobi, Kenya.*