Terms of Reference for continuing to Develop Capacities for a National Forest Monitoring and Measurement, Reporting and Verification System to Support REDD+ Participation of Guyana

Roadmap Phase 1 Achievements, Evolving Requirements and Roadmap for Phase 2 Activities

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Acronyms

AD	Activity data
CBM	Community based monitoring
CMRV	Community measurement, reporting and verification
COP	Conference of Parties
EF	Emission factor
EPA	Environmental Protection Agency
FAO FRA	United Nations Food and Agriculture Organization Forest Resources Assessment
FCPF	Forest Carbon Partnership Facility
FREL	Forest reference emission level
FRL	Forest reference level
GCP	Global Canopy Programme
GFC	Guyana Forestry Commission
GFOI	Global Forest Observations Initiative
GGMC	Guyana Geology and Mines Commission
GHG	Greenhouse gas
GOFC-GOLD	Global Observations of Forest Cover and Land Dynamics
IPCC	Intergovernmental Panel on Climate Change
LCDS	Low Carbon Development Strategy
LULUCF	Land Use, Land Use Change and Forestry
MNRE	Ministry of Natural Resources and the Environment
MRV	Measurement reporting and verification
MRVS	Measurement reporting and verification system
NRDDB	North Rupununi District Development Board
NTC	National Toshaos Council
OCC	Office of Climate Change
REDD+	Reducing emissions from deforestation and forest degradation in developing countries; and the role of conservation, sustainable management of forest and enhancement of forest carbon stocks in developing countries
RL	Reference level
SBSTA	Subsidiary Body of Science and Technical Advice
SDI	Spatial data infrastructure
UG	University of Guyana
UNFCCC	United Nations Framework Convention on Climate Change

1. Introduction

1.1 Background – Roadmap Phase 1

The MRVS Roadmap for Phase 1 was designed to guide the development of a MRV system for REDD+ in Guyana. The development of this roadmap[1] considered the international requirements and national needs for the MRV system. It included a detailed capacity assessment based on the state of the existing national forest monitoring technical capabilities and the requirements for implementation of the MRV system in order to define a detailed plan to establish sustained MRV capacities within the country and to bridge the gap in capacities. The Roadmap was developed through a consultative multi-stakeholder process, which garnered inputs from local and international experts. The aim of Roadmap Phase 1 was to establish a comprehensive national system for monitoring, reporting and verifying forest carbon emissions resulting from deforestation and forest degradation in the country.

Between 2009 and 2012, the roadmap was implemented during three different phases: National Strategy Formulation, Country Readiness Phase and Implementation Phase. This resulted in the development of a sustained and efficient national mechanism and institutional framework with competences for MRV at different levels, including capacities to perform forest area change assessment for historical periods and to perform carbon stock measurements. In addition, sub-national REDD+ demonstration activities were developed, internal and national communication mechanisms were sustained, research on key issues was conducted and Guyana engaged with the international community. Activities included data gap filling, eligibility gap filling, capacity and institutional gap filling, and methodological gap filling.

Through the realization of Roadmap Phase 1, Guyana has made significant achievements in implementing a national forest monitoring and MRV system. This system has served to report on performance on "REDD+ Interim Indicators" outlined in the MoU between Guyana and Norway, the results of which are represented in the annual MRVS Interim Measures Reports. The Guyana-Norway Partnership has shown that some of the methods discussed at international levels are working, especially partnerships between developed and developing countries. Guyana has accomplished pioneering work and substantial capacity improvements, is able to measure and monitor both deforestation and forest degradation and is developing protocols specific to measuring and monitoring the individual drivers of forest change.

Along with work at the national level, Guyana continues to make significant contribution to the global debates on REDD+ and modalities and experiences with monitoring and MRV systems. In the context of evolving agreements at UNFCCC level regarding MRV systems and methodologies for implementation, Guyana made significant progress in piloting methodologies and data collection techniques. This allows for sharing of lessons learnt and taking stock of those lessons for future plans as well as working closely with the international community and high level stakeholders.

[1] GFC, 2009. Terms of Reference for Developing Capacities for a national Monitoring, Reporting and Verification System to support REDD+ participation of Guyana. Background, Capacity Assessment and Roadmap. http://www.forestry.gov.gy/Downloads/Terms_of_Reference_for_Guyana's_MRVS_Final.pdf

1.2 Objectives for Roadmap Phase 2

The overall proposed objective for Roadmap Phase 2 is to consolidate and expand capacities for national REDD+ monitoring and MRV. This will support Guyana in meeting the evolving international reporting requirements from the UNFCCC as well as continuing to fulfil additional reporting requirements e.g. to meet obligations under the bilateral cooperation agreement with the Government of Norway. It will also support Guyana in further developing forest monitoring as a tool for REDD+ implementation. Consolidating and expanding capacities following Roadmap Phase 2 will allow Guyana to fulfil its REDD+ objectives to:

- Underpin and stimulate strategies and priorities for REDD+ implementation
- Track performance of REDD+ activities and their impacts (carbon & non-carbon)
- Continue to support the building of capacity for MRV implementation at the government and non-government level and other parties that have a role in MRVS related activities

Three specific areas were identified where key activities are recommended for the next 1-3 years in order to consolidate and expand capacities:

1. Consolidate capacities and routine REDD+ monitoring and MRV
2. Develop national forest monitoring as tool for REDD+ implementation
3. Knowledge sharing and capacity building

1.3 Format of report

Section two highlights the achievements of Phase 1, identifies the remaining gaps and explains new requirements for forest monitoring and MRV: the evolving international requirements and the national needs. In section three, the process for the development of Roadmap Phase 2 is clarified. Section four gives an overview of the key activities for capacity development in the Phase 2 Roadmap including the actions, responsible agencies and expected key results for three different phases in time (2014, 2015 and 2016 and beyond).

2. Phase 1 achievements and new requirements

2.1 Phase 1 achievements

The MRVS Roadmap Phase 1, which was developed through a multi-stakeholder process in 2009, set the framework for the development of the MRVS. Over a period of three years, progressive steps have been made to build towards implementation of a full MRVS. The MRVS Steering Committee has an overall oversight and coordinating function for the development and implementation of the MRVS and comprises representation of the: Office of Climate Change, Guyana Forestry Commission, Guyana Lands & Surveys Commission, Guyana Geology & Mines Commission, Ministry of Amerindian Affairs, Environmental Protection Agency, University of Guyana, Forest Producers Association, Guyana Gold & Diamond Miners Association and the National Toshaos' Council. The REDD Secretariat was established and nested within the GFC and is responsible for the implementation of technical aspects related to the REDD+ activities. Institutional strengthening has been achieved by building upon existing capabilities within the GFC and REDD Secretariat, such as existing mapping and forest inventory expertise. Key focus was on forest area change assessment and monitoring, and forest carbon stock measurement and monitoring. Especially in the start-up phase, there was significant support from international experts (e.g. Winrock International and Indufor), which included training activities, data collection and the implementation of the MRVS. Most of these activities can now be conducted by GFC solely. GFC staff is involved in South-South capacity development and in training community members. There is also engagement with the University of Guyana for collaboration and training. Capacity building continues to be integral to the successful implementation and sustainability of the MRV system.

MRVS Roadmap Phase 1 was associated with a timeline of 2010/11 for the national strategy formulation, 2011/12 for the country readiness phase and post 2012 for the implementation phase. Tables 1-3 show the expected outcomes and capacity improvements for these three different phases, as outlined in the roadmap, the achievements and the remaining gaps that need to be filled with the implementation of MRVS Roadmap phase 2.

Table 1. MRVS Roadmap phase 1 – objectives and expected key results, achievements and remaining areas for advancement for the national strategy (2010-11).

MRVS Roadmap	National strategy (2010/11): Expected key results	National strategy (2010/11): Achievements	National strategy (2010/11): Continuous Activities and Remaining Areas for Advancement
Objectives	**Gather and integrate information & fill data gaps for national REDD opportunities, scoping andREDD+ implementation**		
Key results and national capacities developed	1. Comprehensive MRV roadmap developed and national MRV steering body operational	1. MRVS Roadmap Completed, MRVS Steering Committee formed and meets quarterly. Partnerships established with bodies such as the GSF, WWF, CMRV, etc.	1. Monitoring of MRVS Roadmap in areas of continuous activities
	2. Improved national capacities for LCDS, REDD, IPCC-LULUCF, and carbon dynamics	2. Dedicated national focal points for LCDS REDD+ and IPCC and capacity built within each	2. Continued capacity development and continuous improvements; sustain capacities in the long-term
	3. Framework and capacities to demonstrate REDD implementation and interim performance	3. Data collection, analysis and reporting capabilities built in FAA and FCSA, and interim reporting. SOPs and protocols developed.	3. Synergies established between national and demonstration initiatives
	4. All data available and accessible (including acquisition of new forest carbon data) on drivers and processes needed for developing a national REDD policy and interim implementation plan	4. Data available on forest carbon, forest area, land use and allocation, historic drivers of change and current drivers, location specific details on forest change. Methods, and training materials. Satellite imagery.	4. Continued collation of MRVS related data for FAA and FCSA. Further expand training in new areas of development including monitoring forest degradation.
	5. Approaches for setting reference levels, linking MRV and policy, and MRV co-benefits and synergies are explored and defined	5. Assessment of historic emissions, two/three annual periods of emission estimates, Proposal for RL for REDD+ for submission to UNFCCC in last quarter of 2014. Exploring co-benefits and synergies.	5. Submit Proposal for RL for REDD+ to UNFCCC

Table 2. MRVS Roadmap phase 1 – objectives and expected key results, achievements and remaining areas for advancement for the country readiness phase (2011-12).

MRVS Roadmap	Country readiness (2011/12): Expected key results	Country readiness (2011/12): Achievements	Country readiness (2011/12): Continuous Activities and Remaining Areas for Advancement
Objectives	**Develop capacities, conduct historical monitoring, and implement a (minimum) IPCC Tier 2 national forest carbon monitoring, establish the reference level and report on interim performance**		
Key results and national capacities developed	1. Capacities in place for consistent and continuous acquisition and analysis of key data for Tier 2 nationally and Tier 3 for demonstration/activity sites including international reporting using IPCC LULUCF; uncertainty assessment MRV improvement plan developed	1. Key category analysis, wall to wall coverage of AD, Establishment of EF for key categories, AD are combined with other key spatial mgt. data layers, peer review, field sampling designed for long term repeated measurement, commencement of process of validation of allometric equations for Guyana, uncertainty analysis, Long term improvement plan developed	1. Monitoring forest degradation and impacts on carbon stock: definition of forest degradation, explore drivers of forest degradation - which processes are important, EF(for forest degradation drivers of mining and infrastructure, as well as shifting agriculture), AD, direct monitoring; Accuracy assessment of forest area change; Uncertainty analysis and management: estimate of error due to the use of allometric model, Monte Carlo type error analysis
	2. Reference level established based on historical data, and future developments using internationally accepted methods	2. Historic RL, expert review, Proposal to UNFCCC under development, stakeholder engagement, Warsaw decisions considered	2. Improve reference level, including assessment of Guyana's Position for RL for REDD+ and submission to UNFCCC, with use of better data and approaches
	3. Regular reporting on REDD demonstrations and interim performance	3. IMR Reporting, CMRV reporting	3. Linking national and sub-national monitoring: reporting and more experiences from demonstration projects
	4. Continued engagement with key national stakeholders for REDD implementation and assuring long-term sustainability of MRV capacities (i.e. universities)	4. MoU with the University, FTCI collaboration, support to partner countries, etc.	4. Continued engagement with the University and other training institutions

Table 3. MRVS Roadmap phase 1 – objectives and expected key results, achievements and remaining areas for advancement for the implementation phase (2012 and beyond).

MRVS Roadmap	Implementation (post 2012): Expected key results	Implementation (post 2012): Achievements	Implementation (post 2012): Continuous Activities and Remaining Areas for Advancement
Objectives	**Establish consistent and continuous MRV supporting national REDD+ actions and international IPCC GPG-based reporting and verification**		
Key results and national capacities developed	1. IPCC key category analysis and assessment for Tier 3 approaches completed and implemented (if desired) 2. Independent international review of full MRV system completed 3. Capacity in place and implementation to deliver verification and compliance assessment for REDD results-based compensation 4. National data infrastructure of forest greenhouse gas inventory and assessment in place for regular reporting 5. Implementation plan to use new and proven technologies to reduce uncertainties and increase efficiency of MRV system	1. IPCC key category analysis completed, key elements operating at Tier 3 2. Independent international review of MRVS Reporting 3. Institutional capacity to deliver verified and compliance assessment. Facilitate verification and process involved. 4. National data infrastructure of management data and land cover data established. Central database continually updated. 5. Integration of key aspects of new and improved technologies in areas of accuracy assessment, monitoring of forest degradation, high resolution data coverage, exploration of radar based data usage in Recover Project, etc.	1. Improve emission factors for some specific processes (towards Tier 3): • Key category analysis – main drivers and contribution • Soil carbon (i.e. mining) • EF for shifting cultivation • Lagged emissions and legacy effects, regrowth 2. Consolidate experience of current third party verification of MRVS and explore plans for separate process of independent review 3. Support continued capacity building to deliver verified results using IPCC Reporting formats for forest carbon emissions and removals 4. Continuous updating of national land cover database and maintain central storage of information 5. Further explore new technologies (different optical sensors) and results of use of radar based data for forest area monitoring

2.2 Evolving international requirements

At the COP19 in Warsaw, in November 2013, discussions on REDD+ advanced and final agreements were made resulting in a complete REDD+ package[2] (known as "The Warsaw Framework on REDD+"). The decisions included, among other things, modalities for national forest monitoring systems, modalities for measurement, reporting and verification, guidance on addressing drivers, safeguards reporting, and procedures for submitting forest reference (emission) levels. Earlier decisions included Methodological guidance for REDD+ (4/CP15) and Modalities relating to forest reference emission levels and forest reference levels (12/II CP.17). The development and implementation of Guyana's MRVS needs to be amended to meet with the evolving international requirements. Table 4 gives an overview of the recent COP decisions, their content and what these decisions imply for the national forest monitoring system.

Table 4. International requirements for national forest monitoring systems and MRV from UNFCCC.

COP decision	COP decision content	Key issues for Guyana
11/CP.19 "Modalities for national forest monitoring systems" 4/CP.15"Methodological guidance for REDD+"	National forest monitoring systems, with, if appropriate, sub-national monitoring and reporting as an interim measure should: • Provide data and information that are transparent, consistent over time, and are suitable for measuring, reporting and verifying anthropogenic forest-related emissions by sources and removals by sinks, forest carbon stocks, and forest carbon stock and forest-area changes • Build upon existing systems, as appropriate • Enable the assessment of different types of forest in the country, including natural forest • Be flexible and allow for improvement • Reflect, as appropriate, the phased-approach Robust and transparent national forest monitoring systems and, if appropriate, sub-national systems as part of national monitoring systems should: • Use a combination of remote sensing and ground-based forest carbon inventory approaches • Provide estimates that are transparent, consistent, as far as possible accurate, and that reduce uncertainties, taking	• Establishment of Guyana's national forest monitoring system follows a phased approach, it is flexible and can be improved over time, (e.g. improve accuracy, reduce uncertainties) and enables the assessment of different types of forest in the country, including natural forest • MRV is a subset of the national forest monitoring system, which is used for a broad range of monitoring purposes

[2]UNFCCC, 2013. 11-15/CP.19; UNFCCC, 2011. 12/II/CP.17; UNFCCC, 2010. 1/CP.16; UNFCCC, 2009. 4/CP15; All decisions available at: http://unfccc.int/documentation/decisions/items/3597.php#beg

	into account national capabilities and capacities • Be transparent, and the results should be available and suitable for review	
12/CP.19 "The timing and the frequency of presentations of the summary of information on how all the safeguards referred to in decision 1/CP.16, appendix I, are being addressed and respected"	• Developing country Parties should provide a summary of information on how all of the safeguards referred to in decision 1/CP.16, appendix I, are being addressed and respected throughout the implementation of the activities • The summary of information should be provided periodically and be included in national communications, or communication channels agreed by the Conference of the Parties; and could also be provided, on a voluntary basis, via the web platform on the UNFCCC website	• Safeguards need to be considered and reported • Modalities for addressing and monitoring safeguards still need to be negotiated. Relation to table 1 ("key REDD efforts")in the JCN has to be clarified
12/II CP.17 and Annex "Modalities relating to forest reference emission levels and forest reference levels as referred to in decision 1/CP.16" 13/CP.19 "Guidelines and procedures for the technical assessment of submissions from Parties on proposed forest reference emission levels and/or forest reference levels" and Annex: "Guidelines for technical assessment"	• Forest reference levels / forest reference emission levels (FRLs/FRELs) are a benchmark for assessing each country's performance in implementing REDD+ activities and are: - Expressed in t CO_2eq per year - Consistent with anthropogenic forest-related GHG emissions and removals from the GHG inventories • FR(E)Ls should be transparent, taking into account historic data, and adjusted for national circumstances • FR(E)Ls may be improved over time, incorporating better data, improved methodologies and / or additional pools • Submission of a FR(E)L shall be subject to a technical assessment • Developing countries may, on a voluntary basis and when deemed appropriate, submit a proposed FRL and/or FREL • The proposed FRL and/or FREL might be technically assessed in the context of results-based payments	• Guyana's reference level should be improved, incorporating better data. The reference level needs to be based on historical data and could be adjusted for national circumstances • The reference level may be submitted to UNFCCC for technical review and feedback. This is also included in the JCN between Guyana and Norway
14/CP.19 "Modalities for measuring, reporting and verifying" and Annex: "Guidelines for elements to be included in the technical annex referred to in decision 14/CP.19, paragraph 7"	• Results (emissions/reductions) in t CO_2 per year, consistent with the assessed reference levels • Data and methodologies may be improved over time, while maintaining consistency with RL • Data and information should be provided through biennial update reports by Parties, including a technical annex - Summary information on assessed RLs	• MRV Results should be consist with reference levels • MRV Results should be submitted through biennial update reports (with a technical annex) and are subject to independent international review through UNFCCC

	- Results in CO_2eq per year consistent with RL - Methods used for establishing RLs and results are consistent • A team of LULUCF experts will perform a technical analysis of the submitted results	
15/CP.19 "Addressing the drivers of deforestation and forest degradation"	• Importance of addressing drivers of deforestation and forest degradation in the context of the development and implementation of national strategies and action plans by developing country Parties • Drivers have many causes, and actions to address these drivers are unique to countries' national circumstances, capabilities and capacities • Countries are encouraged to share the results of their work on this matter, including via the web platform on the UNFCCC website	• Drivers of deforestation and forest degradation should be addressed when developing and implementing the national REDD+ strategies • Participation of relevant stakeholders is important • Importance of cross-sector coordination • Parties, organizations and the private sector should be encouraged to reduce the drivers

World Bank FCPF Methodological Framework

The multi-lateral global initiative Forest Carbon Partnership Facility (FCPF) of the World Bank supports the development of an operational framework for readiness preparation activities. This is done through the Readiness Fund, intended for REDD+ preparation; and the Carbon Fund, intended for performance payments for countries that are piloting emission reduction programs. For countries that seek to obtain performance payments, the World Bank FCPF has developed the Carbon Fund Methodological Framework[3] for carbon accounting of emission reductions programs that are consistent with the UNFCCC guidance on REDD+. The methodological framework provides guidance for the implementation of REDD+ pilot activities in a country. The guidance builds upon a set of guiding principles consisting of relevant elements defined by the FCPF Participants Committee. For each element one or more criteria with indicators are defined to elaborate the requirements of an emission reduction pilot program. These criteria and indicators should be met by countries that are implementing emission reduction programs under the World Bank FCPF.

The guiding principles contain elements relating to the scale and level of ambition of REDD+ implementation, to carbon accounting, to addressing and respecting safeguards, to sustainable program design and implementation and to emission reduction program transactions. The level of ambition of the Carbon Fund is high and emission reduction programs should be implemented at a large scale to demonstrate the potential for full implementation of the variety of interventions of the national REDD+ strategy, covering a significant portion of the country. Criteria for carbon accounting include consistency with the UNFCCC principles, consistency with the most recent IPCC guidance and guidelines as adopted by the COP as a basis for

[3]World Bank FCPF, 2013. Carbon Fund Methodological Framework. Final, December 20, 2013. https://www.forestcarbonpartnership.org/carbon-fund-methodological-framework

estimating forest-related greenhouse gas emissions by sources and removals by sinks. A country may choose which sources and sinks associated with the REDD+ activities to include for accounting, however, at a minimum, emissions from deforestation should be included. Furthermore the carbon accounting section includes guidance and criteria for reducing uncertainties; developing reference levels; measurement, monitoring and reporting on emission reductions; accounting for displacement and reversals; and calculation of emission reductions.

Both the World Bank social and environmental safeguards and the safeguards included in UNFCCC guidance related to REDD+ (Cancun safeguards) should be promoted and supported. Information should be provided on how these safeguards are addressed and respected. This involves broad community support and full and effective participation of relevant stakeholders, including indigenous Peoples and local communities. Sustainable program design and implementation includes criteria on addressing drivers of deforestation and forest degradation assessing land tenure and resource rights, defining a clear, effective and transparent benefit-sharing mechanism and how to monitor and report on non-carbon benefits. Non-carbon benefits could include improving local livelihoods, building transparent and effective forest governance structures, making progress on securing land tenure and enhancing or maintaining biodiversity and/or other ecosystem services.

Guidance on emission reduction program transactions indicates that the status of rights to carbon and relevant lands should be assessed and the country should demonstrate its ability to transfer Title to emission reductions and clarify how potential rights-holders may be included in the benefit sharing arrangements. The emission reduction program should be consistent with the UNFCCC principles of transparency and completeness and therefore should have a comprehensive national or centralized REDD+ program and projects data management system. This is in order to provide transparency to the public, to prevent double counting and to avoid having multiple claims to an emission reduction Title.

2.3 Needs for national REDD+ implementation

A national forest monitoring system can serve a broader purpose than only MRV for REDD+. National forest monitoring in Guyana which is currently done by the GFC, may be further developed to serve as a tool and as a means for multi-sector engagement. Of vital importance is to use the information from the national forest monitoring system to address the key drivers of deforestation and forest degradation in the country.

Besides meeting international reporting needs following the IPCC GPG and Guidelines (see section 2.2), REDD+ national monitoring objectives for Guyana are to:

1. Underpin and stimulate strategies and priorities for REDD+ implementation
2. Track performance of REDD+ activities and their impacts (carbon & non-carbon)
3. Continue to support the building of capacity for MRV implementation at the government, non-government level and other parties that have a role in MRVS related activities

The REDD+ strategy is part of Guyana's Low Carbon Development Strategy (LCDS). Within this frame, the national forest monitoring system is used to keep track of forest change activities and relevant drivers of deforestation and forest degradation. The data generated with the national forest monitoring system should feed into a national data infrastructure, to enable access and sharing for the LCDS. This infrastructure allows multi-sector partners to exchange data and to monitor land resources. Apart from keeping track of forest cover change and the different drivers causing the change, the data should be used to inform policies and to prepare strategies and actions for climate change mitigation and adaptation. Sound data and a good national data infrastructure enable to engage with different partners and to develop joint strategies to address the relevant drivers. This could involve landscape-scale solutions. The multi-sector engagement can be piloted in a demonstration activity to address mining as the key driver of deforestation with the main aim to decouple deforestation from mining.

Another possible function of the national forest monitoring system is to track performance of REDD+ activities and their carbon and non-carbon impacts. Community-based monitoring is a very useful tool to track local drivers of deforestation and their impacts, which can hardly be captured by a national forest inventory or through remote sensing analysis[4]. Data coming from community MRV need to be linked to the national forest monitoring system, thereby allowing sub-national monitoring to inform and strengthen national monitoring. This data exchange is an essential component and it needs to be investigated how this can be done efficiently in Guyana. Developing standard operating procedures with user friendly documentation for communities is part of this. Through a series of pilots pathways for integrating operational sub-national and national monitoring can be tested. For key areas with rapid change, near-real time monitoring will provide a continuous data source. A framework for integrating near-real time monitoring can be developed to ensure that forest-related change events are captured, also when there is regrowth after deforestation.

A well-functioning national forest monitoring system should be able to provide the necessary data to support REDD+ implementation. When countries move into Phase 2 of REDD+, part of REDD+ implementation will be performance-based demonstration activities. The planning of the distribution of financial benefits of carbon credits and/or other REDD+ payments will be an important aspect in this phase[5].Not all payments for REDD+ performance on the sub-national level need to be based on GHG units (e.g. amount of forest area or carbon stocks conserved). In many cases, forest loss results from activities by stakeholders outside of the forest, for example in the agriculture, energy or mining sector. REDD+ drivers need to be tackled directly, therefore REDD+ interventions can also take place outside forests and rewards could go to non-forest stakeholders involved. However, it is difficult to base these rewards on carbon units. This has to be taken into consideration when designing a REDD+ benefit distribution system and an alternative accounting mechanism should be established.

[4]Pratihast et al., Linking community-based and national REDD+ monitoring: a review of the potential. Carbon Management (2013) 4(1), 91–104.
[5]Skutsch et al., Options for a national framework for benefit distribution and its integration with REDD+ monitoring. CIGA-UNAM, Info Brief no. 2. August 2013.

3. Next steps

Working Group Sessions on the development of MRVS Roadmap 2 took place on 24th and 25th March 2014 in Georgetown, Guyana. The consultations with national and international partners and experts reviewed the progress achieved, lessons learned and discussed the foundations for continued engagement and next steps in further developing Guyana's forest monitoring capacities. Main focus of the workshop was:

1. to review the progress made to date, reflect on the need for ongoing and continuous activities and identify gaps in implementation so far;
2. to dialog with national and international partners and experts on achievements, outcomes and lessons learned;
3. to develop next steps for the further development of Guyana's MRVS.

The first day of the workshop included a series of opening remarks and presentations and discussions on progress on MRVS implementation, assessment of technical achievements and progress on MRVS Roadmap and evolving requirements. The second day included technical sessions by national and international stakeholders involved in MRVS implementation with focus on the achievements and lessons learned and suggested next steps for a Roadmap phase 2. In addition three working group sessions and an open discussion on phase 2 Roadmap development were held. The three working groups had the following focus:

1. From Phase 1 – synthesis and priorities for phase 2 (technical issues)
2. Multi-sector governmental engagement in national forest and land monitoring (horizontal coordination)
3. Integration of local and national forest monitoring for REDD+ MRV (vertical coordination)

During the working group sessions pillars for Phase 2 Roadmap and action items were developed. This resulted in a frame for Roadmap Phase 2 development. Figure 1 gives an overview of the progression of Guyana's MRVS. It shows the frame for Roadmap Phase 1 and for Roadmap Phase 2 with the main components for capacity development and the objectives. Capacity development during phase 1 focused on defining a national strategy, developing demonstration activities and implementing REDD+ MRV. Phase 2 capacity development is suggested to focus on consolidating capacities and routine monitoring and MRV, sharing knowledge and capacities and possibly broadening the scope of national forest monitoring by developing it as a tool for REDD+ policy and natural resources management. Whereas the main objective in phase 1 was annual reporting and verification to Norway, the reporting and verification in Phase 2 also needs to be done in conformance with requirements of the UNFCCC (see section 2.2). Apart from reporting, other objectives are to: underpin and stimulate strategies and priorities for REDD+ implementation and track performance of REDD+ activities and their impacts and to support the building of capacity for MRV implementation at the government and non-government level (see section 2.3).

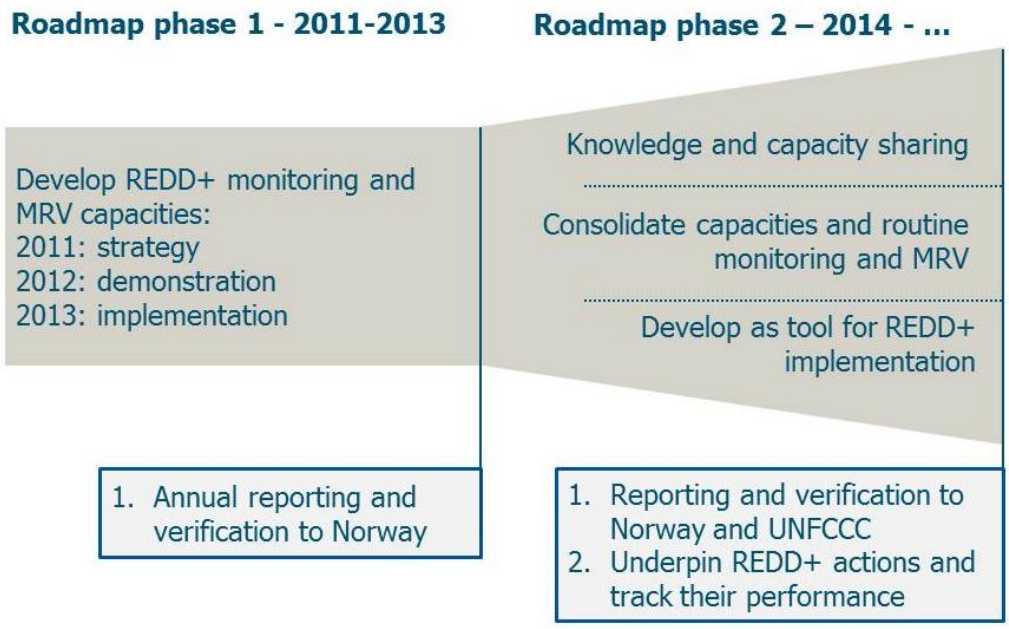

Figure 1. Progression of Guyana's REDD+ monitoring: frame for Roadmap Phase 1 and Roadmap Phase 2.

4. Key activities for capacity development in Phase 2

This list provides an overview of the proposed national forest monitoring and REDD+ MRV activities as part of the Roadmap Phase 2. These activities are scheduled to take 1-3 years, starting in 2014. There is flexibility to include additional activities or speed up the capacity development process if desired by Guyana and based on the outcomes of the international negotiations on REDD+ and a potential future Norway-Guyana agreement. It is clear that the proposed activities will rely on a stable source of funding the coming years. The activities have been structured under the following three main themes:

1. Consolidate capacities and routine REDD+ monitoring and MRV
2. Develop national forest monitoring as tool for REDD+ implementation
3. Knowledge sharing and capacity building

1. Consolidate capacities and routine REDD+ monitoring and MRV

1.1 Continue routine monitoring of activity data and emission factors

- Based on already established capacities at the GFC, continue the monitoring of activity data and emission factors on a routine basis in Guyana to provide annual estimates of forest related emissions
- Seek help and support from international partners as appropriate to improve national capacities and data access (i.e. to satellite data) and technical expertise as required to adapt the MRV to accommodate new technologies, methods and report requirements.

1.2 Refining the measurement and reporting of forest degradation and reforestation/regrowth

- Consolidate analysis of current and new drivers of forest degradation
- Test and agree on a definition reflecting the key processes leading to forest degradation and that will guide following steps by using existing data and its relationship to definition of forest
- Implement for further research and systematic measuring and monitoring with focus on main sources of emissions from forest degradation, reforestation and regrowth on the national level

1.3 Improve emission factors for some specific processes (towards Tier 3)

- Continued ground-based measurements on forest carbon stocks and stock changes, improve allometries and other relevant variables important for estimating emission factors
- Perform a key category analysis according to IPCC GPG
- Improve estimates and considerations related to soil carbon emission (i.e. in the context of mining)
- Measure and improve the emission factors from shifting cultivation
- Explore approaches and implement monitoring for assessing lagged emissions and legacy effects, and the GHG removals from forest regrowth and reforestation (i.e. from rehabilitation)

1.4 Refine and submit an improved reference level

- Analyse historical data and emissions estimates as database of reference level estimation
- Explore options of adjusting the historical trend based on considering the key drivers of forest change
- Explain and implement adjustments as appropriate based on a robust understanding on importance of specific driver-related adjustments, related uncertainties in predicting expected future developments, and aiming at lowering risks of inflating the reference level
- Prepare a report and submit the reference level for technical assessment to the UNFCCC
- Document the progression and differences to the current reference level defined as part of the Norway-Guyana agreement

1.5 Advance uncertainty assessments

- Continue the process of updating and capacity improvements based on error analysis and lessons learned from uncertainty assessments
- Include spatial analysis and spatial aspects to improve uncertainty levels and potential biases in the rates of change
- Uncertainty assessment on other types of errors in addition to sampling errors in the emission factors (e.g. Monte Carlo approaches)
- Document and publish the results and methods developed for Guyana

1.6 Regular and updated reporting

- Continued reporting as required by the Guyana/Norway agreement
- Include reporting in accordance with IPCC guidelines and tables
- Use forest monitoring data to improve estimation and international LULUCF and GHG inventory; i.e. for the National Communications and reporting to the FAO FRA
- Performance report should be compatible with UNFCCC guidance and the related technical annex in the COP 20 decision on MRV modalities, and including the assessment of different forest types including natural forests and including potentially moving towards biennial reporting

1.7 Continued verification

- Continued verification as required by the Guyana/Norway agreement and refine engagement parameters as required
- Seek opportunities to use the UNFCCC roster of experts to perform a verification and solicit feedback as defined by the UNFCCC decisions on modalities for MRV and including potentially moving towards biennial verifications

1.8 Develop foundations and data sources for a REDD+ safeguard information system:

- Explore the use the REDD+ monitoring and MRV data to assist the development of a Safeguard Information System, also in the context of evolving guidance from the UNFCCC negotiations on this matter

1.9 Continuous improvements and research

- Prioritize research needs based on current capacity and knowledge gaps
- Engage in dedicated research on evolving technologies to improve estimates in activity data and emission factors based on available funding
- Seek opportunities to engage and implement special studies on emission and removals from mining

2. Develop national forest monitoring as tool for REDD+ implementation

2.1 Assess REDD+ and LCDS priorities and implications on forest monitoring

- Work with relevant national partners for a strategic assessment of the role of REDD+ and LCDS in productive sectors linked to drivers of forest change in Guyana. Additionally, the requirements for transformation of the productive sectors along a low carbon pathway should also be addressed.
- Assess the implications and priorities for forest monitoring to be expanded to support REDD+ implementation and effect deforestation in addition to mapping effort.

2.2 Institutional arrangements and multi-sector engagement

- Use existing mechanisms such as MRV Steering Committee and the GIS and RS monitoring unit for natural resources agencies to discuss possibilities for an active multi-sector engagement in forest monitoring based on needs and targets advocated from the policy side
- Develop an agreement for the institutional framework for an active multi-sector engagement to use and integrate the GFC-generated forest monitoring data for the purpose of other agencies and their role in REDD+ and LCDS. A first needs assessment developed as part of a related workshop can serve as a base (Guyana workshop report)

2.3 Use and analyse available data to support REDD+ implementation

- GFC to work with the GIS and RS monitoring unit from natural resources agencies to develop some key strategic analysis:
  - Identify hotspots and locations of deforestation due to mining expansion
  - Analysis of areas and overlaps of mining and forest concessions
  - Provide information to the Land Reclamation Project (LRP) that can be used to support identifying suitable mined-out sites to be reclaimed and aligned with the MRV
- Use forest monitoring data to improve towards more climate-friendly mining practices. The findings of the analysis should lead to prioritized REDD+ actions and locations
- At the cross sectorial level, assess the role of forest monitoring to inform implementation of the national land use plan

2.4 Develop a national spatial data infrastructure for the LCDS

- Define a framework to enable data access and sharing for the LCDS, beyond what is currently done for the MRVS
- Evaluate and implement the national SDI including a data policy, an institutional framework, and transparent and open source exchange of data

2.5 Implement a demonstration activity addressing mining as key driver

- Demonstration pilot to the multi-sector engagement in monitoring to decouple deforestation from mining expansion
- Implement research and monitoring of forest-related emissions and removals for implementing REDD+ activities on:
  - Improving approaches and lowering impacts from prospecting for mining
  - Efforts in moving to low-impact and clean mining operations
  - Advance efforts in evaluating opportunities to rehabilitate mined-out areas
- Assess feasibilities of different methodological options to scale-up monitoring to larger areas

2.6 Build capability of local communities and stakeholders to monitor forests

- Synthesize previous and experiences and implement a series of pilots for linking and integrating local and national monitoring with key stakeholders (i.e. local communities, forest field officers, miners)
- Develop and test Standard Operating Procedures including. user friendly documentation for non-technical users
- Enable and facilitate to assist in building capacity on national and local level to establish an exchange of data of information in both directions on:
    - Forest change monitoring
    - Forest carbon measurement
    - Reporting on REDD+ implementation
    - Creating synergies between CMRV and national MRVS

2.7 Options for near-real time monitoring for high priority sites

- Test different data streams and their usefulness and integration for near-real time monitoring of forest changes and REDD+ implementation starting in high priority sites
- Develop a framework to use near-real time monitoring to ensure compliance of deforestation agents

2.8 Track REDD+ activities and their impacts

- Combine and amend different data streams to support the local tracking of implementation of REDD+ activities and their performance
- Explore options to assess and monitor non-carbon benefits (i.e. livelihoods, water quality, biodiversity) for REDD+ implementation
- Provide monitoring data input to evolving frameworks for REDD+ implementation

3. Knowledge sharing and capacity building

3.1 Present and communicate MRV phase 1 progress in international fora

- Prepare a series of communication and outreach materials
- Aim for a dedicated side event at UNFCCC SBSTA or COP

3.2 Exchange of information and capacities with national stakeholders

- Communication and explanation of the national forest monitoring system to different governmental actors through a series of workshops, including communication materials
- Run a series of meetings to present and explain data and tools of Guyana's MRV system and discuss options for exchanging data and capacities
- Continue partnership with University of Guyana to use, define and support dedicated research activities to improve national and local capacities and for training and education in higher education institutions on forest carbon monitoring

3.3 Capacity development and sharing of lessons learned with local communities

- Develop communication materials, feedback forum and information exchange to build national awareness
- Explore options on a mid-term review forum
- Identify opportunities for inclusion and implementation role in REDD+ for other Government and non- Government stakeholders
- Enable and facilitate training and capacity exchange workshops

3.4 Webportal to communicate and access information from the national forest monitoring system

- Explore options for development of an agency-wide web portal
- Conduct a feasibility study and explore identified options from previous experiences (i.e. TerraAmazon or TerraCongo, Google EarthEngine) and develop a plan on which data to use for this purpose
- Implement a web portal and use it as active communication and feedback tool

3.5 Engage in South-South collaboration

- Explore interest and options with neighbouring countries (i.e. Guiana Shield) and other partners to learn from positive Guyana experience
- Implement training and capacity exchange as appropriate

3.6 Scientific work, publication and synthesis

- Continue and advance partnership with national and international higher education institutions
- Explore options to publish relevant findings in conjunction with International leads in the peer-reviewed scientific literature
- Engage in synthesizing Guyana experiences in research collaborations and international processes such as GOFC-GOLD and the GFOI

The roadmap in Table 5 lists expected outcomes and capacity improvements for the coming 3 years. The table includes the proposed activities, the agency that is responsible for the implementation of the activity and a timeframe for implementation of the specific actions.

Table 5. Roadmap Phase 2 – activities, responsible agency and expected key results for different phases.

1. Consolidate capacities and routine REDD+ monitoring and MRV				
Activity	**Who**	**Immediately (2014)**	**2015**	**2016 and beyond**
1.1 Continue routine monitoring of activity data and emission factors	GFC	• Based on already established capacities at the GFC, continue the monitoring of activity data and emission factors on a routine basis in Guyana to provide annual estimates of forest related emissions • Seek help and support from international partners as appropriate		
1.2 Refining the measurement and reporting of forest degradation and reforestation/regrowth	GFC	• Consolidate analysis of current and new drivers of forest degradation • Test and agree on a definition for monitoring forest degradation	• Implement for further research and systematic measuring and monitoring with focus on main sources of emissions from forest degradation, reforestation and regrowth on the national level	
1.3 Improve emission factors for some specific processes (towards Tier 3)	GFC	• Continued ground-based measurements on forest carbon stocks and stock changes	• Perform a key category analysis according to IPCC GPG • Further improve allometries and other relevant variables • Measure and improve the emission factors from shifting cultivation	• Improve estimates and considerations related to soil carbon emission (in the context of mining) • Monitoring for assessing lagged emissions and legacy effects, and GHG removals from forest regrowth and reforestation • Assess the feasibility of updating the land cover maps (i.e. from rehabilitation)
1.4 Refine and submit improved reference level	GFC, OCC	• Analyse historical data, and assess, explain and implement adjustments as appropriate • Submit the reference level for technical assessment to the UNFCCC	• Continued updating and adaptation of RL as appropriate	
1.5 Advance uncertainty assessments	GFC	• Continue the process of updating and capacity improvements based on error analysis and lessons learned from uncertainty assessments	• Include spatial analysis and spatial aspects to improve uncertainty levels and potential biases in the rates of change	• Uncertainty assessment on other types of errors in addition to sampling errors in the emission factors (e.g. Monte Carlo approaches)

1.6 Regular and updated reporting	GFC, OCC	• Continued reporting as required by the Guyana/Norway agreement • Include reporting in accordance with IPCC guidelines and tables; report should be compatible with UNFCCC guidance (technical annex)	• Continued reporting as required by the Guyana/Norway agreement • Use forest monitoring data to improve estimation and international LULUCF and GHG inventory	• Continued reporting as required by the Guyana/Norway agreement • Performance reporting to include the assessment of different forest types including natural forests (UNFCCC dec.)
1.7 Continued verification	GFC, OCC	• Continued verification as required by the Guyana/Norway agreement • Seek opportunities to use the UNFCCC roster of experts to perform a verification and solicit feedback as defined by the UNFCCC decisions on modalities for MRV and including potentially moving towards biennial verifications		
1.8 Develop foundations and data sources for a REDD+ safeguard information system	GFC, OCC	• Explore the use the REDD+ monitoring and MRV data to assist the development of a Safeguard Information System, also in the context of evolving guidance from the UNFCCC negotiations on this matter		
1.9 Continuous improvements and research	GFC and research partners	• Prioritize research needs based on current capacity and knowledge gaps	• Engage in dedicated research on evolving technologies to improve estimates in activity data and emission factors • Seek opportunities to engage and implement special studies on emission and removals from mining • Evaluate new processing methods that assist in the automation of change detection	
2. Develop national forest monitoring as tool for REDD+ implementation				
Activity	**Who**	**Immediately (2014)**	**2015**	**2016 and beyond**
2.1 Assess REDD+ and LCDS policy priorities and implications on forest monitoring	MSSC of the LCDS, OCC	• Work with relevant national partners for a strategic assessment of the role of REDD+ and LCDS in productive sectors linked to drivers of forest change in Guyana. Additionally, the requirements for transformation of the productive sectors along a low carbon pathway should also be addressed.		• Assess the implications and priorities for forest monitoring across sector agencies, to be expanded to support REDD+ implementation and effect deforestation in addition to mapping effort
2.2 Institutional arrangements and multi-sector engagement	GIM - (Geographic Information Management Unit of MNRE), OCC, MNRE	• Use existing mechanisms to discuss possibilities for an active multi-sector engagement	• Develop an agreement for the institutional framework for an active multi-sector engagement to use and integrate the GFC-generated forest monitoring data for the purpose of other agencies and their role in REDD+ and LCDS	

2.3 Use and analyse available data to support REDD+ implementation	GIM - (Geographic Information Management Unit of MNRE), OCC, MNRE	• Identify hotspots and locations of deforestation due to mining expansion • Analysis of areas and overlaps of mining and forest concessions • Provide information to the Land Reclamation Project (LRP) that can be used to support identifying suitable mined-out sites to be reclaimed and aligned with the MRV	• Prioritize REDD+ actions and locations	• At the cross sectorial level, assess the role of forest monitoring to inform implementation of the national land use plan
2.4 Develop a national spatial data infrastructure for the LCDS	GIM	• Define a framework to enable data access and sharing for the LCDS across key land management agencies	• Implement the national SDI including a data sharing protocol that provides for utilisation of data in REDD+ implementation.	
2.5 Implement a demonstration activity addressing mining as key driver	GGMC, EPA, MNRE	• Demonstration to pilot the multi-sector engagement in monitoring to decouple deforestation from mining expansion • Implement research and monitoring of forest-related emissions and removals for implementing REDD+ activities on: o Improving approaches and lowering impacts from prospecting for mining o Efforts in moving to low-impact and clean mining operations o Advance efforts in rehabilitating mined-out areas • Assess feasibilities of different methodological options to scale up monitoring to larger areas		
2.6 Expand national monitoring to include local communities and stakeholders	MNRE, GFC, NRDBB, Iwokrama, NTC, GCP, other key stakeholders (local communities, forest field officers, miners)	• Develop and test Standard Operating Procedures incl. user friendly documentation for non-technical users	• Enable and facilitate to assist in building capacity on national and local level to establish an exchange of data and information in both directions on: o Forest change monitoring o Forest carbon measurement o Reporting on REDD+ implementation o Creating synergies between CMRV and national MRVS	o Synthesize previous and experiences and implement a series of pilots for linking and integrating local and national monitoring with key stakeholders
2.7 Options for near-real time monitoring for high priority sites	GFC	• Test different data streams and their usefulness and integration for near-real time monitoring of forest changes and REDD+ implementation starting in high priority sites		• Develop a framework to use near-real time

			monitoring to ensure compliance
2.8 Track REDD+ activities and their impacts	GFC, MNRE	• Combine and amend different data streams to support the local tracking of implementation of REDD+ activities and their performance • Explore options to assess non-carbon benefits (i.e. livelihoods, water quality, biodiversity) for REDD+ implementation	• Provide monitoring data input to evolving frameworks for REDD+ implementation

3. Knowledge sharing and capacity building				
Activity	**Who**	**Immediately (2014)**	**2015**	**2016 and beyond**
3.1 Present and communicate MRV phase 1 progress in international fora	GFC, through MRV steering committee, OCC, MNRE, other key agencies	• Prepare a series of communication and outreach materials • Aim for a dedicated side event at UNFCCC SBSTA or COP		
3.2 Exchange of information and capacities with national stakeholders	GFC, OCC, MNRE, UG	• Communication and explanation of the national forest monitoring system to different governmental actors • Run a series of meetings to present and explain data and tools of Guyana's MRV system and discuss options for exchanging data and capacities • Continue partnership with University of Guyana to use, define and support dedicated research activities and for training and education		
3.3 Capacity development and sharing of lessons learned with local communities	GFC, OCC, MNRE	• Develop communication materials, feedback forum and information exchange • Explore options on a mid-term review forum • Identify opportunities for inclusion and implementation role in REDD+ for other Government and non- Government stakeholders • Enable and facilitate training and capacity exchange workshops		
3.4 Webportal to communicate and access information from the national forest monitoring system	GFC, MNRE, OCC	• Explore options for development of a web portal • Conduct a feasibility study and explore identified options from previous experiences and develop a plan on which data to use for this purpose • Implement a web portal and use it as active communication and feedback tool		
3.5 Engage in South-South collaboration	OCC, MNRE, GFC	• Explore interest and options with neighbouring countries (i.e. Guiana Shield) and other partners to learn from positive Guyana experience • Implement training and capacity exchange as appropriate		
3.6 Scientific work, publication and synthesis	GFC, UG	• Continue and advance partnership with national and international higher education institutions • Explore options to publish relevant findings in the peer-reviewed scientific literature • Engage in synthesizing Guyana experiences in research collaborations and international processes such as GOFC-GOLD and the GFOI		