Review of Guyana MRV Process, Current Plans and Status.

James Singh

Guyana Forestry Commission

October, 2009

Structure of Presentation

- Background
- The MRVS Approach
- Outline of activities initiated and/or completed so far in the MRVS development process:
  - Plans for readiness as outlined in the RPP
  - Assessment of existing data - Assessment of current institutional framework, resources and capacity
  - Preliminary work on Forest Carbon Stock Assessment and Baseline Establishment
  - Preliminary work in forest cover mapping and monitoring.
  - Assessment of drivers of deforestation and degradation in Guyana

- Planned activities for MRVS

- Summary of next steps

Background

- Guyana has over 80% of its land area covered by forest, approximately 16 million hectares.

- The Government of Guyana aims to sustainably utilize, protect and maintain the forests to contribute to global carbon emissions reductions and at the same time attract resources to foster growth and development along a low carbon path.

- Guyana's draft Low Carbon Development Strategy sets out a vision through which economic development and climate change mitigation will be enabled through the generation of payments for forest services in a mechanism of sustainable utilization and development.

- Under the WB FCPF, Guyana submitted an RPP. The RPP is one component of the LCDS.

- One of the main outputs of the RPP is the development of the MRVS

Background

To enable the development of the MRVS, several key areas are identified to be addressed.

- The MRVS needs to fit within a framework of accepted principles and procedures of estimation and reporting forest carbon emissions and removals at the national level as specified by the IPCC Good Practice Guidelines and Guidance for reporting on the international level.

- There must be a clear outline of the REDD Implementation strategy which will define the parameters for the MRVS. This will also entail the assessment of a reference emissions level.
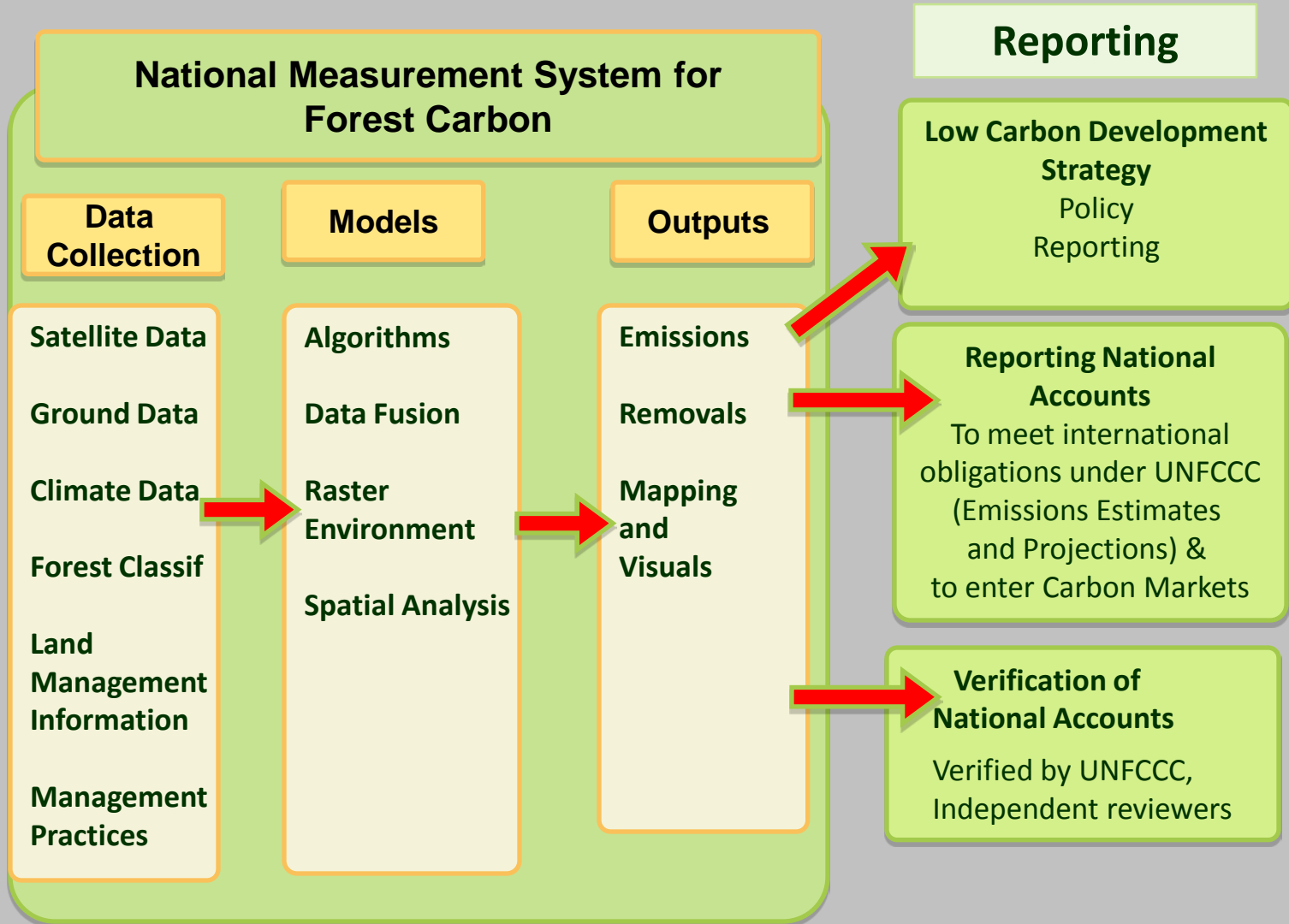
The MRVS Approach

The RPP outlines the objective of the MRVS as being:

■ The objective of the <u>monitoring system</u> is to provide annual, accurate estimates of changes in forest cover and degradation with national coverage by a transparent, objective and verifiable methodology.

■ The <u>reporting system</u> provides comparisons between monitoring system output summaries and the reference scenario to provide net changes in carbon for REDD accounting.

■ The <u>verification system</u> requires that all procedures and data sources are objective, well-documented, secure and verifiable, and are subject to such peer-review and external audit as may be determined necessary. The Reporting and Verification Systems will be outlined and developed more fully later in the preparation process.

Initial Workshop held on 15th Sept, 2009. General Framework drafted:

Reporting

National Measurement System for Forest Carbon

Data Collection	**Models**	**Outputs**
Satellite Data	Algorithms	Emissions
Ground Data	Data Fusion	Removals
Climate Data	Raster Environment	Mapping and Visuals
Forest Classif	Spatial Analysis	
Land Management Information		
Management Practices		

Low Carbon Development Strategy
Policy
Reporting

Reporting National Accounts
To meet international obligations under UNFCCC (Emissions Estimates and Projections) & to enter Carbon Markets

Verification of National Accounts
Verified by UNFCCC, Independent reviewers

- Plans for Readiness

Main areas outlined in RPP: Establishment of Historic and Future Reference Scenario

Schedule	Year 1	Year 2	Year 3
Assessment of data available on forest area, land cover change and carbon density.	▓		
Development of historical trend reference scenario for looking at land cover change, forest carbon density and deforestation and forest degradation.		▓	
Complete reference scenario modeling for: development plan, trends and macroeconomic trends forecasting following compilation of data on these areas.		▓	▓
Review by independent expert.			▓

Existing Resources Assessment: Data and Capacity

Information System Capability	Human and Physical Capacity	Data Availability	Gaps that Institutions have identified based on current mandate
1. Integrated GIS	Computed resources, integrated server, trained persons in geo referencing, geo rectifying, masking, identification of areas subject to change, identify of driver of change by visual inspection, digitizing of area of change, merging of assessment at national level and generation of final national level data. GPS mapping	1.Land area monitoring of large and medium size mining claims. 2.Water quality data on suspended sediments (turbidity and TSS) for a five year period for Guyana, and 10 -15 years for various rivers. 3.Dredge locations August 2009. 4.Tidal water quality data for Essequibo river. 5.Road Map 6.Forest Roads and Rivers Map 7.Soil Map (NARI) 1:1,000,000 scale 8.Vegetation Map 1:1,000,000 scale 9.Topographic Mao 1:50,000 10.Gazetteer of Guyana 11.Map showing Amerindian Areas, Tourism areas, protected areas, agriculture leases, and identified land uses in some areas.	Management of small claims needs further integration into land management system Time series of Dredge location data/real time position logging. Integrated data management system

Existing Resources Assessment: Data and Capacity

Information System Capability	Human and Physical Capacity	Data Availability	Gaps that Institutions have identified based on current mandate
2. Remote Sensing Assessments	Remote sensing image analysis software, trained persons in conducting remote sensing assessments including: geo referencing, digitizing of area of change,	1.Landsat medium resolution images (20m) for entire land cover of Guyana for 2005 and 2006. 2.Aeromagnetic data at 200m line spacing. 3.Scanned 1: 50,000 topographic basemaps 4.JERS 30m resolution imagery 5.SRTM 90m DEM 6.JERS 1999 – 500M 7.Landsat 2006 – 2009 – national coverage 8.PALSAR 2009 (hotspots coverage) 9.CBERS 2009 (hotspot coverage)	High resolution images for mining hotspots Automated detection of forest land area change needed

Existing Resources Assessment: Data and Capacity

Information System Capability	Human and Physical Capacity	Data Availability	Gaps that Institutions have identified based on current mandate
3. Forest Concession Management and Legality Assessment	Trained staff in visual detection of occurrences of illegality based on a decision tree framework, forest area allocation and planning.	1.Forest concession allocation map 2.Change detection system	Integrated planning and management with other natural resources agencies

Information System Capability	Human and Physical Capacity	Data Availability	Gaps that Institutions have identified based on current mandate
4. Field Data on forest inventory, and initial work on forest carbon stock assessment	Staff trained in executing forest inventory and in establishing forest biomass monitoring plots, destructive sampling of soil and necromass, some training in roots and tree destructive sampling, and in ground truthing and some training in verifying data via aerial surveys.	1.Report on carbon storage capacity by soil type (Hans ter Steege) 2.Biomass Monitoring System reports and Baseline Assessment 3.135 Biomass monitoring plots established 4.Management level inventory for various areas in Guyana.	Additional training in tree and roots sampling. Training and creation of framework in the integration of this work into an MRVS.

Preliminary work on Forest Carbon Stock Assessment and Baseline Establishment

- Institutional structure - REDD Secretariat established

- Establishment of biomass measurement and monitoring plots (135)

- Soil and necromass data collected for some plots.

- Training commenced for root and tree sampling.

Preliminary work on Forest Carbon Stock Assessment and Baseline Establishment

- Biomass estimates using forest inventory data tabulated – by diameter classes

- Total sequestered carbon as tree biomass in Guyana – by forest type/vegetation classes

- Ecosystem carbon including soil and necromass – by vegetation class, and carbon pools.

- Baselines estimated using historic data

- Stratification of main vegetation classes for biomass monitoring
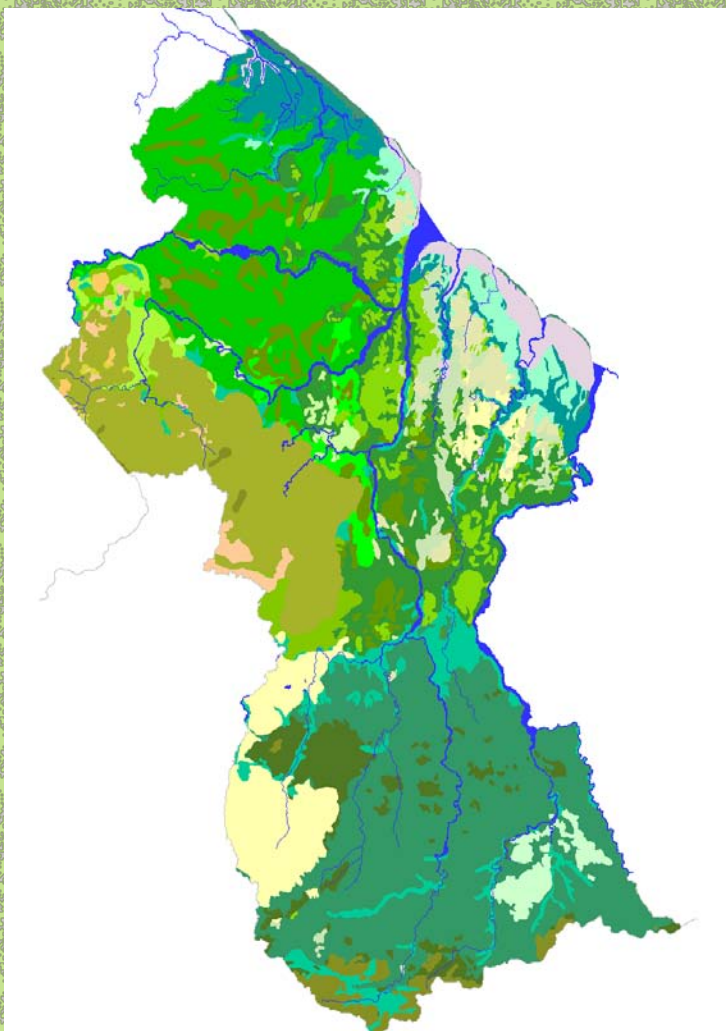
Code	Vegetation Types	Map	Area (km^2)
1.1	Mixed forest Central/NE Guyana		20,858
1.2	Mixed forest NW Distict		28,393
1.3	Mixed Forest Pakaraimas		3,233
1.4	Mixed Forest South Guyana		47,789
1.5	Mixed Forest on steep hills		7,817
1.6	Mixed Forest on steep hills Pakaraimas		3,339
1.7	Mixed Forest on steep hills South Guyana		6,922
1.8	Mixed Forest/Swamp complex		2,513
2.1	Clump Wallaba Forest		1,016
2.2	Clump Wallaba/Wallaba Forest		2,522
2.3	Wallaba Forest		7,329
2.4	White Sand Forest South Guyana		136
2.5	Dakama Forest		4,234
2.6	Muri scrub/white sand savannah		3,810
3.1	Open Swamp		4,604
3.2	Marsh Forest		9,891
3.3	Coastal Swamp Forest		7,865
3.4	Forested Islands in Rivers		765
4.1	Mangrove Forest		1,262
5.1	Lowland grass/shrub savannah		11,287
6.1	Upland scleromorphic scrub		525
6.2	Upland grass/shrub savannah		1,940
6.3	Broadleaf upland meadow		196
7.1	Submontaine Forest Pakaraimas		23,549
7.2	Montaine Forest Pakaraimas		275
8.1	Submontaine Forest Southern Guyana		3,090
9.0	Clearings, cultivated land, large mines		4,687
	Rivers, lakes, streams		5,123
TOTAL			214,970

Simplified vegetation classes and inventory areas

Legend:
- Cultivated or cleared land
- Lowland mixed forest
- Hill or montane forest
- Wallaba forest
- Dakama forest
- Scrub or savannah
- Swamp, marsh or mangrove
- ● Inventory locations
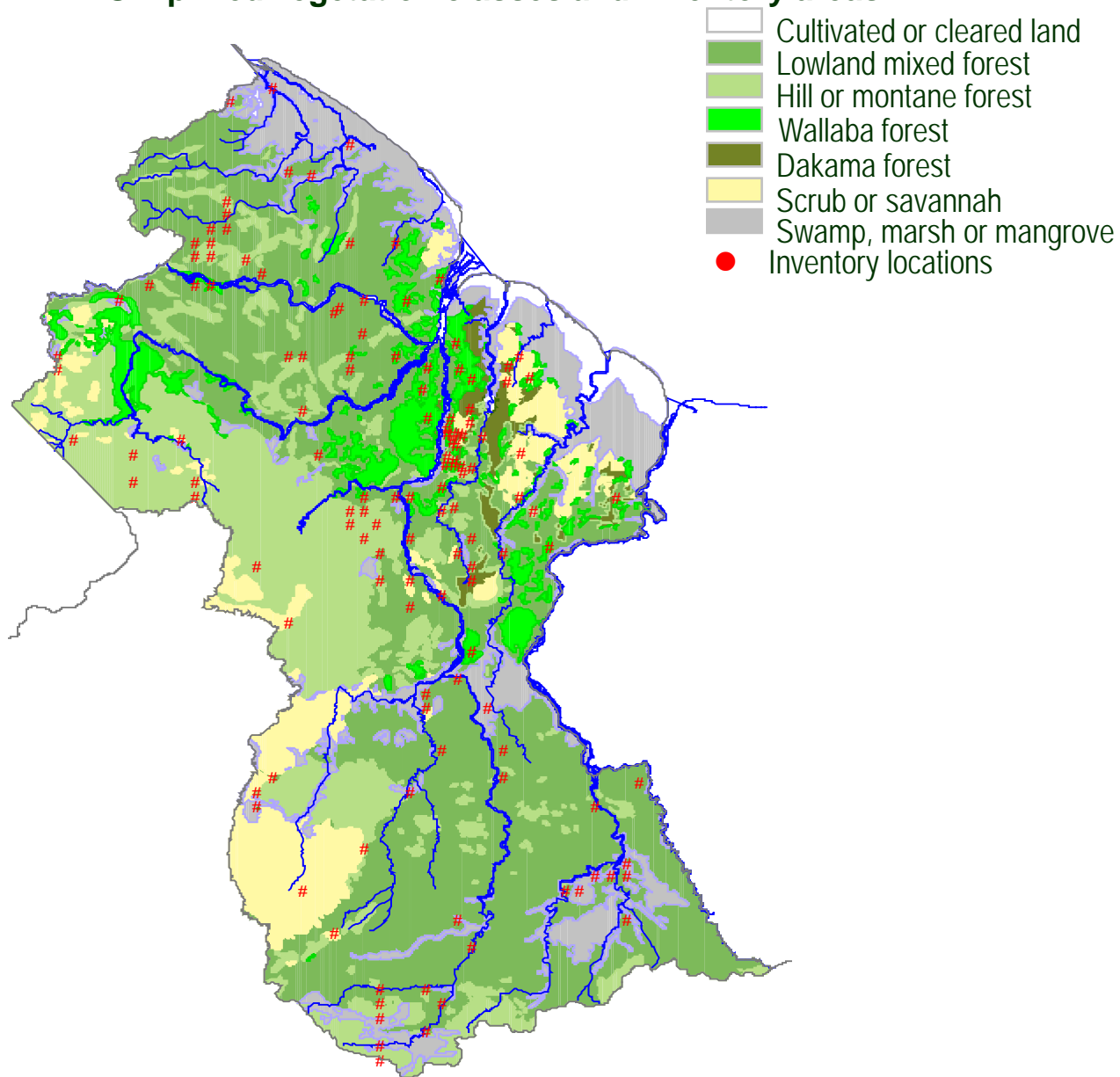
Total sequestered carbon as tree biomass in Guyana

Vegetation Class	Area	Tonnes per hectare				Total, millions tonnes			
	km^2	Above ground biomass	Biomass incl. roots	Carbon	CO_2 equiv.	Above ground biomass	Biomass incl. roots	Carbon	CO_2 equiv.
Lowland Mixed Forest	100,408	361	440	220	807	3,621	4,417	2,209	8,098
Hill/Montane Forest	45,190	342	418	209	766	1,547	1,888	944	3,461
Wallaba Forest	10,867	460	561	280	1,028	499	609	305	1,117
High forest subtotal	156,465	362	442	221	810	5,668	6,914	3,457	12,676
Dakama Forest	4,234	184	224	112	410	78	95	47	174
Scrub or Savannah	17,562	77	93	47	171	134	164	82	300
Swamp/Marsh Forest	26,899	192	235	117	431	518	632	316	1,158
Cultivated/urban/cleared	4,687					-	-	-	-
Total land area	209,847	305	372	186	682	6,397	7,805	3,902	14,309

Ecosystem carbon including soil and necromass

Vegetation Class	Area km^2	Carbon tonnes per hectare					Total carbon, millions tonnes					CO_2 equiv. Gigatonnes
		Above ground biomass	Roots	Necro-mass	Soil carbon	Total	Above ground biomass	Roots	Necro-mass	Soil carbon	Total	
Lowland Mixed Forest	100,408	180	40	19	33	271	1,810	398	190	326	2,725	9.99
Hill/Montane Forest	45,190	171	38	18	33	259	774	170	81	147	1,172	4.30
Wallaba Forest	10,867	230	51	24	33	337	250	55	26	35	366	1.34
High forest subtotal	156,465	181	40	16	33	272	2,834	623	297	509	4,263	15.63
Dakama Forest	4,234	92	20	10	22	143	39	9	4	9	61	0.22
Scrub or Savannah	17,562	38	8	4	22	72	67	15	7	38	127	0.46
Swamp/Marsh Forest	26,899	96	21	10	84	211	259	57	27	225	568	2.08
Cultivated/urban/cleared	4,687		-	-		-	-	-	-	-	-	-
Total land area	209,847	152	34	16	37	239	3,199	704	336	780	5,018	18.40

Preliminary work in forest cover mapping and monitoring

- In Guyana, as part of its Readiness Preparation Proposal to the FCPF, an initial, national level quick assessments were done on the drivers of deforestation and forest degradation: a qualitative assessment based on national sectoral analysis and a quantitative assessment based on GIS and Remote Sensing Data.

- LANDSAT Images at national wall to wall coverage
- Change detection employed
- Hot spot spatial assessment at high resolution, aerial surveys and ground truthing also executed

Preliminary work in forest cover mapping and monitoring

- A total of 54, 210 ha of deforested area and 2626 km of forest roads were mapped during the period 2007-2008.

- Of this total, it is estimated that approximately 34, 044 ha of deforested area is found within the State Forest Estate (SFE).

- Total State Forest Area is 13.8 million hectares while total forest cover is 18.6M million hectares.

- Based on this Quick Assessment, the rate of deforestation in the SFE is 0.25% while the rate in Guyana forest cover is 0.29%.

Planned Activities for MRVS

Activities	Y1, Q1	Y1, Q2	Y1, Q3	Y1, Q4	Y2, Q1	Y2, Q2	Y2, Q3	Y2, Q4	Y3, Q1	Y3, Q2	Y3, Q3	Y3, Q4
Output 1 – Assessment of Drivers of Deforestation and Forest Degradation in Guyana												
1.1 Review existing laws, policies, field assessment and relevant technical reports.												
1.2 Meet and consult with stakeholder groups												
1.3 Compile assessment analysis												

Activities	Y1 Q1	Y1 Q2	Y1 Q3	Y1 Q4	Y2 Q1	Y2 Q2	Y2 Q3	Y2 Q4	Y3 Q1	Y3 Q2	Y3 Q3	Y3 Q4
<u>Output 2 – Monitoring Forest Area</u>												
2.1 Identify relevant and required activity data	▓	▓										
2.2 Assess availability of activity data for deforestation and forest degradation		▓	▓									
2.3 Develop Remote sensing system and build capacity at key institutions and stakeholder levels		▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	
2.4 Conduct remote sensing analysis at medium resolution and at identified sites at high resolution			▓	▓			▓	▓		▓	▓	▓
2.5 Develop procedures for measuring change in forest area			▓	▓								
2.6 Monitor change in forest area					▓	▓					▓	▓

Activities	Y1 Q1	Y1 Q2	Y1 Q3	Y1 Q4	Y2 Q1	Y2 Q2	Y2 Q3	Y2 Q4	Y3 Q1	Y3 Q2	Y3 Q3	Y3 Q4
<u>Output 3 – Establishing Reference Emission Levels</u>												
3.1 Develop Benchmark forest map			▓	▓								
3.2 Identify main Deforestation and Degradation data from Output 1				▓								
3.3 Assess reference emission levels				▓	▓							

Activities											
Output 4 – Conduct Estimation of Forest Carbon Stock in Forest											
4.1 Assess existing information and resource capacities	▓	▓									
4.2 Conduct key capacity building sessions for process of carbon estimation	▓	▓	▓	▓							
4.3 Assess existing forest stratification and adapt and modify if necessary		▓	▓								
4.4 Define Carbon Pools to be measured and develop forest carbon stock map		▓	▓								
4.5 Sampling intensity identified and sample design finalized			▓								
4.6 Data collected on identified carbon pools on biomass stock				▓	▓	▓	▓	▓	▓	▓	▓
4.7 Establish coefficients and allometric functions for identified carbon pools to be measured						▓	▓	▓	▓	▓	
4.8 Conduct accuracy assessments and uncertainty analyses				▓	▓	▓	▓	▓	▓	▓	▓

Activities	Y1	Y1	Y1	Y1	Y2	Y2	Y2	Y2	Y3	Y3	Y3	Y3
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Output 5 – Estimating CO2 Emissions and Removals												
5.1 Define Land Use Categories and land conversion by sub categories	■											
5.2 Identify suitable method/combination of methods for assessing annual carbon stock change		■	■									
5.3 Identify capacity requirements and build capacity across key agencies.			■	■	■	■	■	■	■	■		
5.4 Conduct estimation of emissions and removals									■	■	■	■

Activities	Y1	Y1	Y1	Y1	Y2	Y2	Y2	Y2	Y3	Y3	Y3	Y3
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Output 6 – Conduct Reporting and Verification												
6.1 Develop and complete reporting tables				▓	▓					▓	▓	▓
6.2 Develop quality assurance and quality control procedures					▓						▓	▓
6.3 Conduct Accuracy and uncertainty assessments on data and results						▓	▓			▓		
6.4 Develop capacity in reporting, QA/QC, validation and verification.									▓			▓
6.5 Conduct third party verification											▓	▓

Key Issues Identified

- **Anthropogenicity** - The MRV system needs to be able to separately estimate anthropogenic and natural emissions.

- **Degradation** - In assessing degradation, the intensity, extent of area and technique to be used are important considerations. Very high spatial resolution sensors will be required for mapping low intensity degradation. Costly Field assessments must be done.

- **Interannual variability** due to changes such as climate can cause significant time-series volatility in annual emissions estimates. Various policy approaches are being discussed, and an MRV system should be in a position to take account of this.

Key Issues Identified

- **Leakage**: the potential for a climate mitigation project in one area to displace emission generating activity to another area, rather than abate total emissions. Policy frameworks and monitoring systems need to guard against such effects. National wall-to-wall monitoring of changes in land cover and land use supports such policy measures.

- **Permanence**: the persistence of emissions reductions made in forest carbon activities. Permanence policies can be supported by continuous, time-series and spatially consistent forest monitoring.

- **Baselines:** time-series consistent monitoring from archival data can provide a baseline of historical trends.

- **Additionality**: where policy frameworks call for additionality, one or both of two key tests usually apply (1) that the activity will have effect beyond projections of business-as-usual baselines as described above, and/or (2) that it is an activity that would not be otherwise economically viable.

Ministry/Agency	Tentative Role in MRVS
Office of the President	Strategic guidance and directives
National Climate Committee	Networking, coordination and technical support
Ministry of Agriculture	Data on agriculture activities, scale, scope, occurrences, plans and projections
Ministry of Amerindian Affairs	Amerindian Lands date: scale, number of titles, coverage, etc
Ministry of Finance	Strategic Guidance on policy and planning
Guyana Forestry Commission.	Key coordinating agency, support field work for MRVS and RS activities, consultation and networking among relevant agencies and stakeholders.
Guyana Geology and Mines Commission	Key support agency for mining sector information including RS and GIS capabilities and resources.
Guyana Lands and Surveys Commission	Key support agency for land use planning sector information including RS and GIS capabilities and resources.
Environmental Protection Agency	Support to aspect relating to environmental monitoring and management
REDD Secretariat	Support the execution of MRVS activities
Hydrometeorological Service	Assist in provision of weather data
University of Guyana	Support to research and assessments

Ministry/Agency	Tentative Role in MRVS
Amerindian Communities	Support the implementation of MRVS activities especially in areas of consultation and information sharing/gathering exercises.
Community-based NGOs	Support to process in technical and research aspects of monitoring.
International NGOs and multi-lateral institutions	Support to process in technical and research aspects of monitoring.
Private Sector	Support to overall implementation
Other Forest based Communities	Support the process and advice on impact on communities. Assist in consultation and information sharing.
Civil Society	Support to overall implementation

Summary of Next Steps

- **Finalise Terms of Reference**
  - Technical work to be done
  - Identify resources and capacity needs
  - Identify institutional and operational requirements

- **Secure suitable provider/s for execution of outputs to work in collaboration with GoG.**

- **Execute and monitor activities**

..end