

Expert Workshop on Step-wise Approaches for Improving National Forest Monitoring and REDD+ MRV Capacity Development

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Outline of Presentation

- Background to MRV System Development
- Developing the design of the MRV System (MRV Roadmap)
- Implementation of work under MRV
 - Forest Area Change Assessment (FACA)
 - Forest Carbon Monitoring System (FCMS)
- Guyana's experiences in building capacities for National Forest Monitoring (NFM) for REDD+ MRV
- Factors that have led to success in capacity building
- Recommendations for Improving NFM

Background to MRV System Development

- Work on the development of the MRVS started in 2009

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

- There needs to be established 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.
- As well as an outline of the REDD Implementation strategy for the MRVS. This will also entail the assessment of a reference emissions level

Developing the Design of the MRV System

- In developing the design of the MRV System, a number of key technical experts were engaged through the following Workshops:
 - **Methodological and Organization Design of a Future REDD+ MRV System in Guyana, September 14-15, 2009:** During this workshop, a group of thirty-one Guyanese and international forestry, climate change, and spatial and remote sensing data experts from the Government of Norway's Climate and Forest Initiative, United Nations Development Programme and Food and Agriculture Organization, William J. Clinton Foundation, United States Forest Service and (former) Canadian Forest Service, World Resources Institute, ESRI and Winrock International, joined individuals from the Guyana Forestry Commission and Guyana Lands and Surveys Commission to offer their advice to the Government of Guyana.
 - **Preparing Guyana's REDD+ participation: Developing capacities for monitoring, reporting and verification, October 27-29, 2009:** this workshop involved the inputs of the local stakeholders and experts from both government and non-government organisations, and involved a series of consultations with relevant agencies were in efforts to prepare Guyana's participation in REDD+ mechanisms. Key technical expert, Dr. Martin Herold of the GOFC GOLD Office facilitated the workshop. A primary outcome of this workshop was the MRVS Roadmap.
- Through these key workshops, Guyana was able receive feedback on key considerations for developing a MRV System for Guyana.

MRV System Roadmap

- A Road Map was developed, which outlined progressive steps over a 3 year period that will build towards a full MRVS being implemented.
- Undertook a capacity building approach
- The first year in the Roadmap started in 2010 and required for a number of initial reporting activities to commence which will assist in shaping the next steps planned for 2011 and 2012.

Table 4: MRV road map – objectives and expected key results for different phase

	National strategy (2010/11) →	Country readiness (2011/12) →	Implementation (post 2012)→
Objectives	Gather and integrate information & fill data gaps for national REDD opportunities, scoping and policy development	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	Establish consistent and continuous MRV supporting national REDD+ actions and international IPCC GPG-based reporting and verification
Key results and national capacities developed	<ol style="list-style-type: none"> 1. Comprehensive MRV roadmap developed and national MRV steering body operational 2. Improved national capacities on LCDS, REDD, IPCC-LULUCF, and carbon dynamics 3. Framework and capacities to demonstrate REDD implementation and interim performance 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 5. Established communication and participation mechanism to involve relevant stakeholders nationally and internationally 6. Approaches for setting reference levels, linking MRV and policy, and MRV co-benefits and synergies are explored and defined 	<ol style="list-style-type: none"> 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 2. Reference level established based on historical data, and future developments using internationally accepted methods 3. All data available and accessible for an updated national REDD implementation plan 4. Regular reporting on REDD demonstrations and interim performance 5. Continued engagement with key national stakeholders for REDD implementation and assuring long-term sustainability of MRV capacities (i.e. universities) 6. Monitoring system explored to cover key variables for other ecosystem services 	<ol style="list-style-type: none"> 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 6. Framework developed that links REDD into LCDS monitoring, reporting and verification system

Table 5: MRV road map – specification of activities for gap filling

	National strategy →	Country readiness →	Implementation →
Objectives	Gather and integrate information & fill data gaps for national REDD opportunities scoping and policy development	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	Establish consistent and continuous MRV supporting national REDD+ actions and international IPCC GPG-based reporting and verification
Data gap filling	<ul style="list-style-type: none"> • Gather, evaluate and integrate existing data sources on the national level • Acquire additional data (if needed) to analyze (the carbon impact) of all relevant historical forest change processes and drivers (i.e. using satellite data, initial carbon stock assessments and ancillary information) • Assessment of historical and current processes of forest carbon change for formulating national REDD policy strategy and related MRV priorities, and respond to an initial set of interim performance indicators 	<ul style="list-style-type: none"> • Establish mechanisms and partnerships with relevant data sources (i.e. satellite data) to facilitate availability to Guyana in a consistent and continuous way • Data gathering and analysis of drivers and factors of forest carbon change to support an assessment of future driver activities and related/projected forest carbon changes • Collect data for a first comprehensive uncertainty assessment of the different measurement and monitoring components 	<ul style="list-style-type: none"> • Conduct an IPCC key category analysis • Assess opportunities and data gaps to move towards Tier 3 on the national or sub-national (if desired) • Foster and support REDD activity-based monitoring by different actors as part of national framework
Eligibility gap filling	<ul style="list-style-type: none"> • Develop a national REDD strategy • Involvement of all relevant stakeholders at the national and sub-national level – set up a sustained two-way communication mechanism • Participation in international REDD and REDD readiness processes • Scope a framework for immediate demonstration actions and interim performance indicators that will respond to an international REDD mechanism 	<ul style="list-style-type: none"> • Continued involvement of all relevant stakeholders at the national and sub-national level • Provide an assessment of carbon emissions (and removals) as historical reference level and expectations/forecasting future development • Develop a national implementation plan and related policies to encourage REDD actions by relevant stakeholders • Implement and evaluate REDD implementation activities, and report performance for interim indicators 	<ul style="list-style-type: none"> • Implement an international review of the MRV system • Prepare regular interactions and reporting on REDD implementation activities and on the IPCC LULUCF inventory • Verification and compliance assessment comparing performance against the reference level

<p>Capacity and institutional gap filling</p>	<ul style="list-style-type: none"> • Complete an comprehensive assessment of existing data and capacities considering international and national MRV requirements • Set up a national MRV coordination mechanism to steer the capacity development and assign roles and responsibilities • Develop capacities to monitor given a set of interim performance indicators • Engage in general capacity building on REDD, IPCC-LULUCF, terrestrial carbon dynamics and key standard methods • Interaction with local actors and key implementation bodies on their role for MRV 	<ul style="list-style-type: none"> • Build sustained capacities to conduct regular and consistent forest and forest area change monitoring using remote sensing and GIS • Establish capacities and implement a systematic national forest carbon measurement and monitoring system, i.e. through permanent sample plots. • Scope and evaluate a sub-national, activity-based measurement program, to monitor key REDD implementation actions • Training and implementation of reporting (IPCC LULUCF) including an institutional framework • Develop and implement an uncertainty assessment and a long-term improvement plan for the MRV system • Scope the involvement of national/regional higher-education institutions 	<ul style="list-style-type: none"> • Continuous training and improvement for institutions and activities providing data and analysis for the REDD MRV system, • Build a national spatial data infrastructure for IPCC LULUCF reporting and REDD implementation • Develop additional monitoring capacities (if needed, to go for Tier 3) • Build a system for verifying REDD actions on the national level using MRV data and other information, link MRV of transactions • Develop and implement an uncertainty assessment and a long-term improvement plan for the MRV system • Implement capacities in higher-education institutions on REDD MRV for university curricula
<p>Methodological gap filling</p>	<ul style="list-style-type: none"> • Interaction and partnership with national and international research organizations on key issues • Exploration of methods and approaches for establishing reference levels • Evaluate concepts for linking MRV, REDD policy and implementations • Explore potential co-benefits and synergies of the carbon measurements with other monitoring needs 	<ul style="list-style-type: none"> • Interaction and partnership with national and international research organizations on key issues • Develop frameworks for interlinked implementing REDD policies and MRV and linking MRV of actions and MRV of transactions • Exploration of evolving technologies for REDD MRV • Assess the requirements of monitoring carbon variables and relevant information for other ecosystem services 	<ul style="list-style-type: none"> • Foster activities to reduce uncertainties and increase efficiency of MRV system • Implement evolving technologies into regular REDD MRV activities • Finalize exploration of REDD MRV and implementation including broader ecosystem services and environmental accounting procedures and make recommendations.

Implementation of work under MRV

- The aim of the MRVS is to establish a comprehensive, national system to monitor, report and verify forest carbon emissions resulting from deforestation and forest degradation in Guyana.
- With the development of the MRVS Roadmap, implementation of works begun in 2010 in two areas:
 - Forest Area Change Assessment
 - Forest Carbon Monitoring System
- These activities determine the historical and current patterns of emissions coming from forest, their drivers and the carbon stock present in the various pools.

Forest Area Change Assessment

- Guyana has completed forest area change assessments for the following periods:
 - 1990 to 2000
 - 2001 to 2005
 - 2006 to 2009 September
 - 01 October, 2009 to 30 September, 2010 (Year 1)
 - 01 October, 2010 to 31 December, 2011 (Year 2)
- A benchmark map was created, providing a snapshot of forest area as at 30 September 2009.
- The Years 1 & 2 forest area change assessments cover periods after the benchmark map. For these periods, all forest to non-forest changes are mapped spatially and reported.

Forest Area Change Assessment

- For the Benchmark and Year 1 analyses, medium resolution satellite images were used to calculate the forest area, in accordance with Guyana's national definition of forest for REDD+, as at 1990.
- The total forested area at this point was estimated as 18.39 million hectares (ha) (with an indicative accuracy of 97.1%), of which 15.5 million ha is administered by the State.
- Forest change between 2010 and 2011, was determined using high resolution (5 m) RapidEye imagery over Year 1 change areas.
- In other words, the change reported in this Assessment captures only the change that took place in the 15 month period under review – Year 2.
- The use of 5 m RapidEye imagery is a significant improvement over Year 1, as for a large part of Guyana which accounts for most of the allocated forest area, it offers resolution at 5 m as compared to 30 m primarily used in Year 1. This allows for more refined reporting of change areas.
- For the remaining areas in Year 2 assessment (areas not covered by Rapideye), Landsat TM and ETM+ were used.

Forest Area Change Assessment

- Forest change of forest to non-forest excluding degradation between October 2010 and December 2011 (15 months) is estimated at 9 889 hectares.
- Over the Year 2 reporting period, this equates to a total deforestation rate of 0.054%.
- This rate of change is largely similar, and a small percentage lower than Year 1 - October 2009 to September 2011 (12 months) which was reported as 0.056%.
- The results of the independent accuracy assessment conducted by the University of Durham (UoD) also calculated a similar rate of change for Year 2 (0.053%). At the end of the Year 2 period, the area of forest remaining is estimated at 18.378 million ha.
- The accuracy of the mapping as calculated by the UoD is 99.2%
- Significant progress was made in Year 2, in mapping forest degradation. The area of degradation as measured by direct interpretation (based on a degradation study) of the 5 m RapidEye satellite imagery is 5 460 ha.

Forest Area Change Assessment

- For the fifteen months Year 2 period (2010 to 2011) deforestation has remained relatively constant at 9 889 ha/yr. This is equivalent to a deforestation rate of 0.054%/yr for the period, which is very similar, and actually a marginal percentage lower, to the Year 1 rate (12 months) of 0.056%/yr.
- The main deforestation driver for the current forest year reported (Year 2) is mining which accounts for 94% of the deforestation in this period.
- It should be noted that the driver of mining, includes mining infrastructure.
- A majority (96%) of deforestation is observed in the State Forest Area.
- Additionally the temporal analysis of forest change post 1990 indicates that most of the change is clustered around existing road infrastructure and navigable rivers.
- This provides a useful basis for planning an on-going monitoring programme that focuses on key hotspot areas.

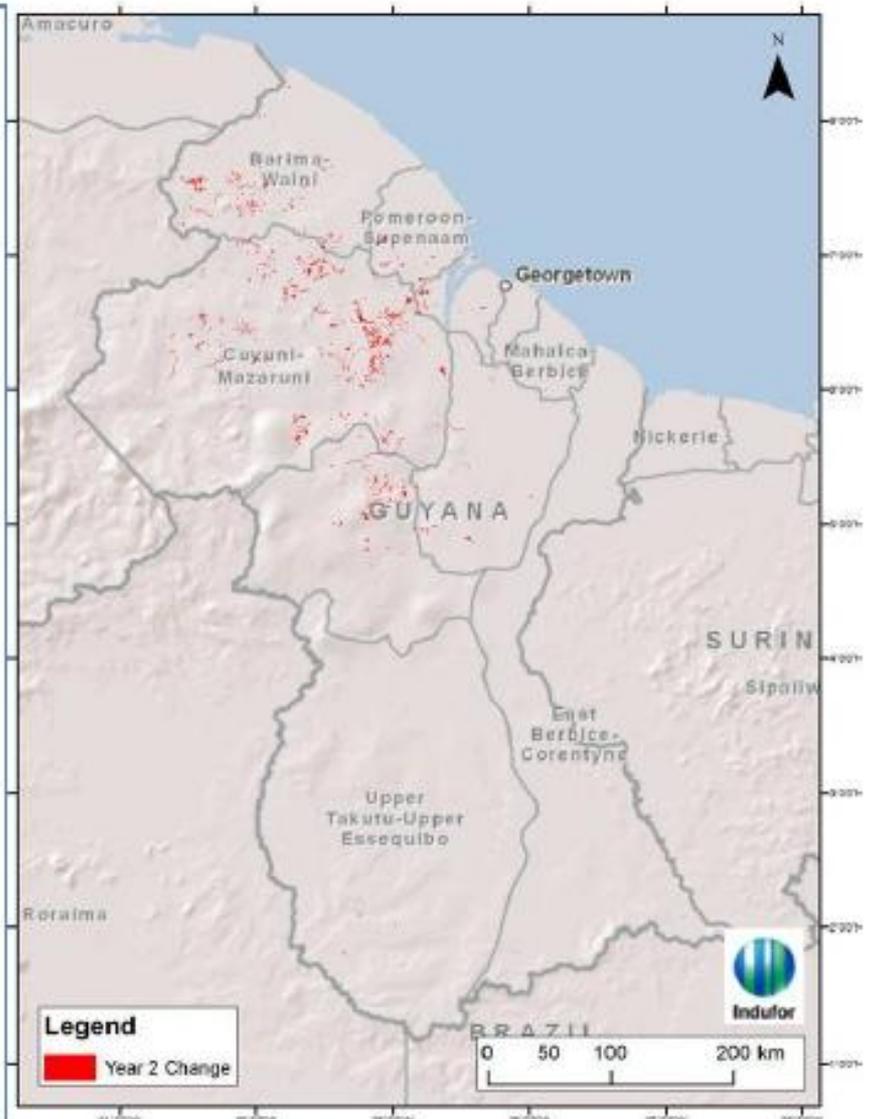
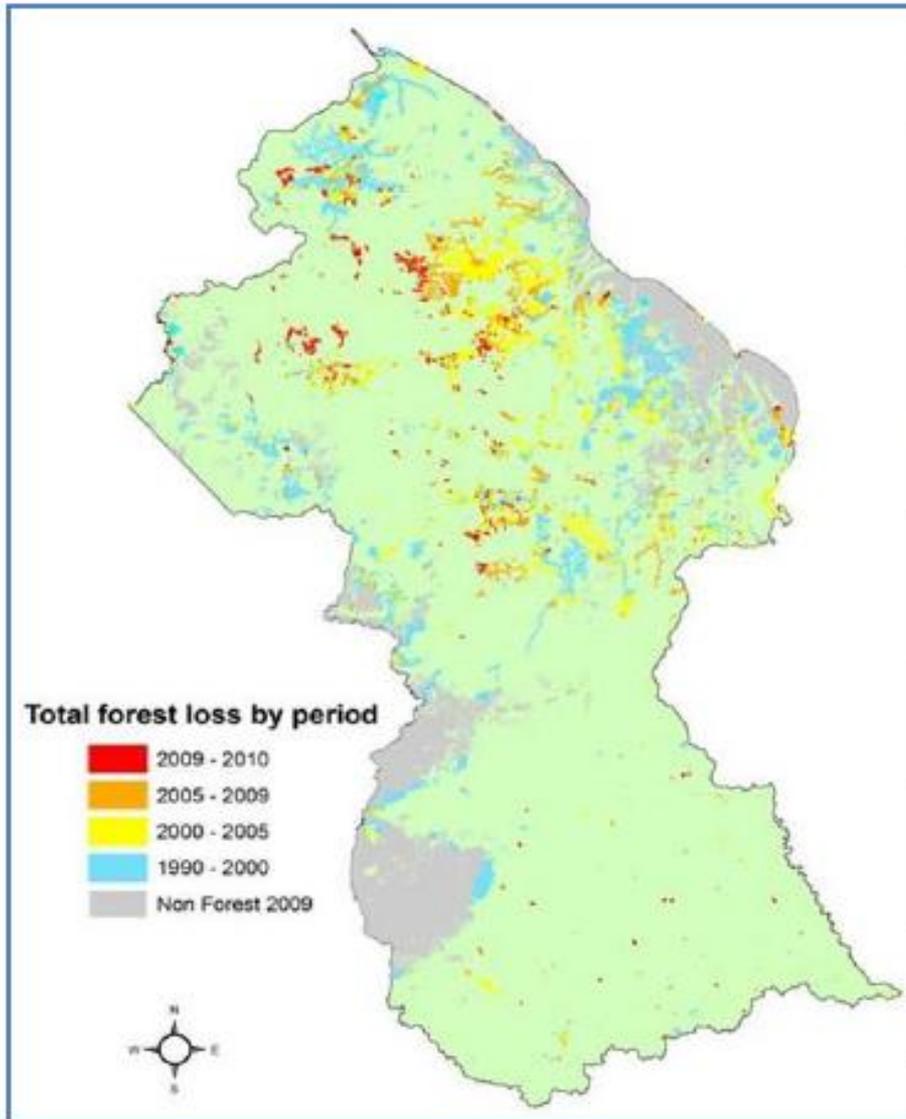
Area Deforested over Period 1990- 2011

Period	Years	Forest Area ('000 ha)	Change ('000 ha)	Change (%)
Initial Forest area 1990		18 473.39		
Benchmark (Sept 2009)	19.75	18 398.48	74.92	0.41%
Year 1 (Sept 2010)	1	18 388 .19	10.28	0.06%
Year 2 (Oct 2012 to Dec 2011)	1.25	18 378. 30	9.88	0.05%

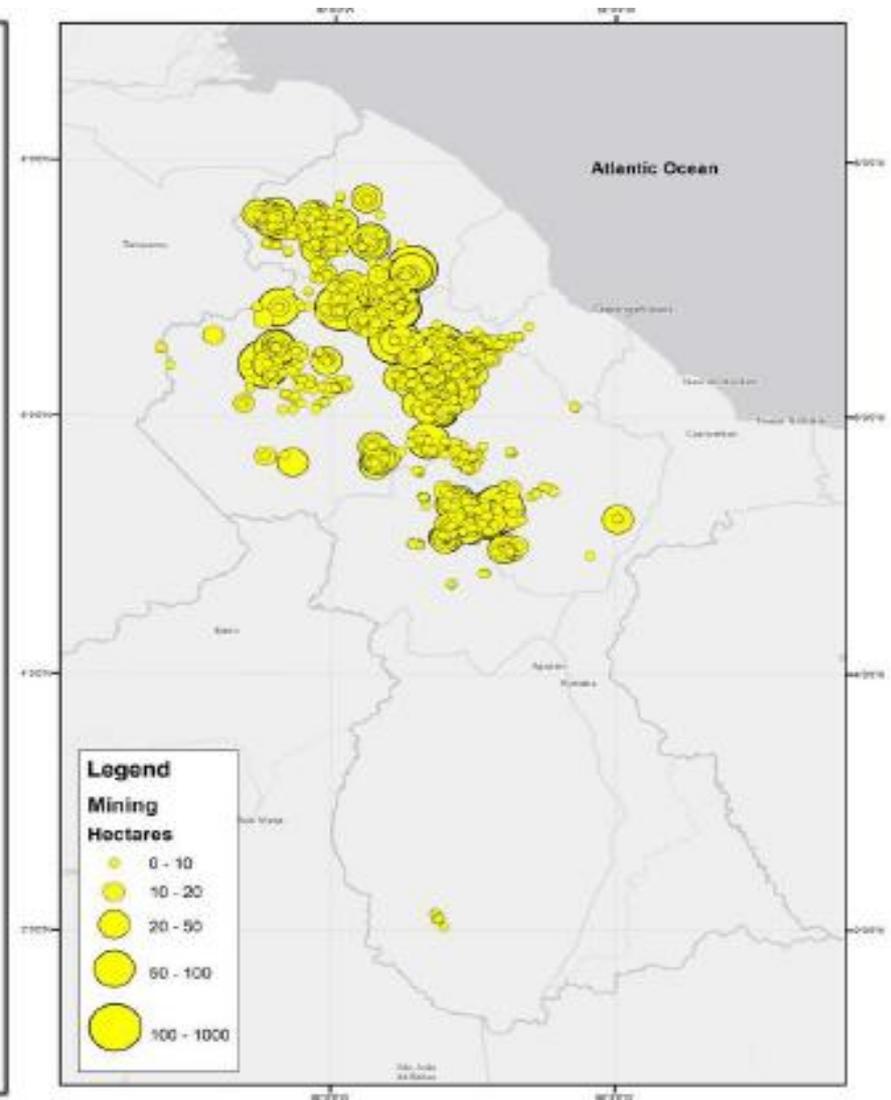
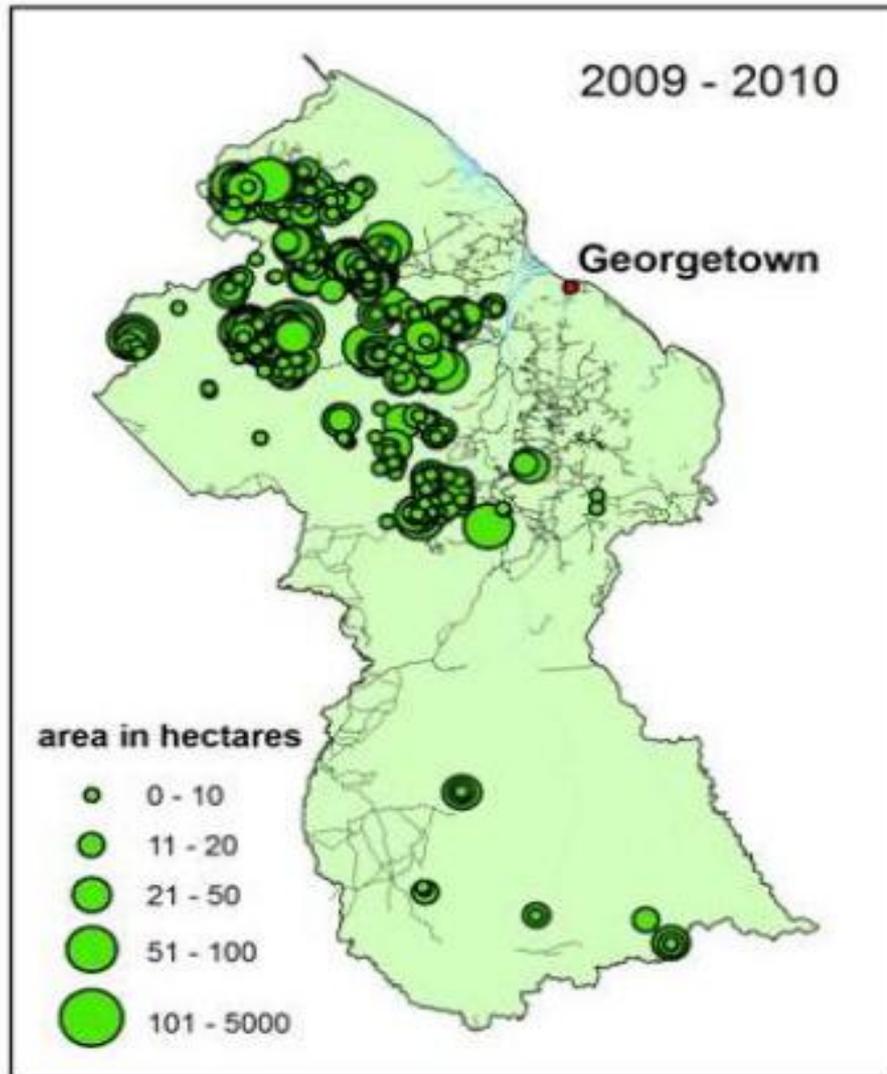
Forest Area Change by Period & Driver from 1990- 2011

Driver	Historical Period			Year 1 2009-10	Year 2 2010-11 (15 months)	
	1990 to 2000	2001 to 2005	2006 to 2009		Deforestation	Degradation
	Area (ha)					
Forestry (includes forestry infrastructure)	6 094	8 420	4 784	294	233	147
Agriculture	2 030	2 852	1 797	513	52	N/A
Mining (includes mining infrastructure)	10 843	21 438	12 624	9 384	9 175	5 287
Infrastructure	590	1 304	195	64	148	5
Fire (deforestation)	1 708	235		32	58	28
Amaila Falls development					225	
Area Change	21 267	34 249	19 400	10 287	9 891	5 467
Total Forest Area of Guyana	18 473 394	18 452 127	18 417 878	18 398 478	18 388 190	
Total Forest Area of Guyana Remaining	18 452 127	18 417 878	18 398 478	18 388 190	18 378 299	
Period Deforestation %	0.01%	0.04%	0.02%	0.06%	0.05%	

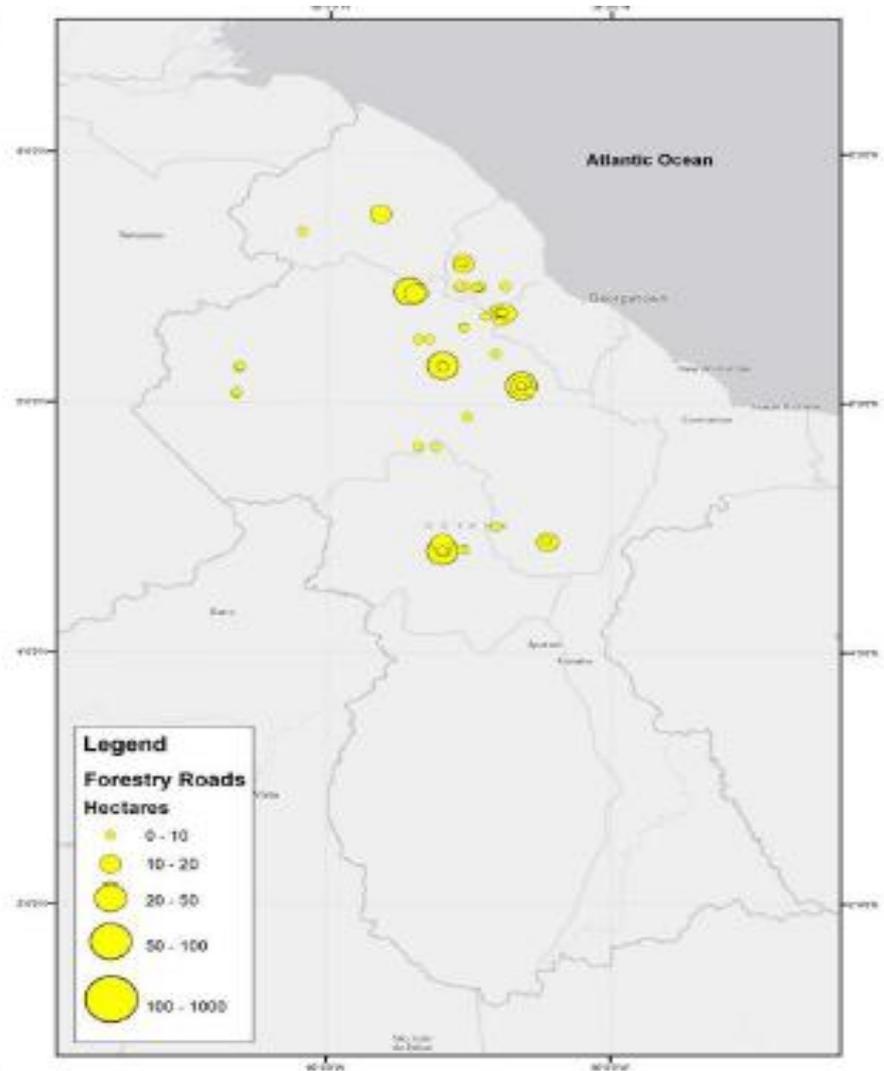
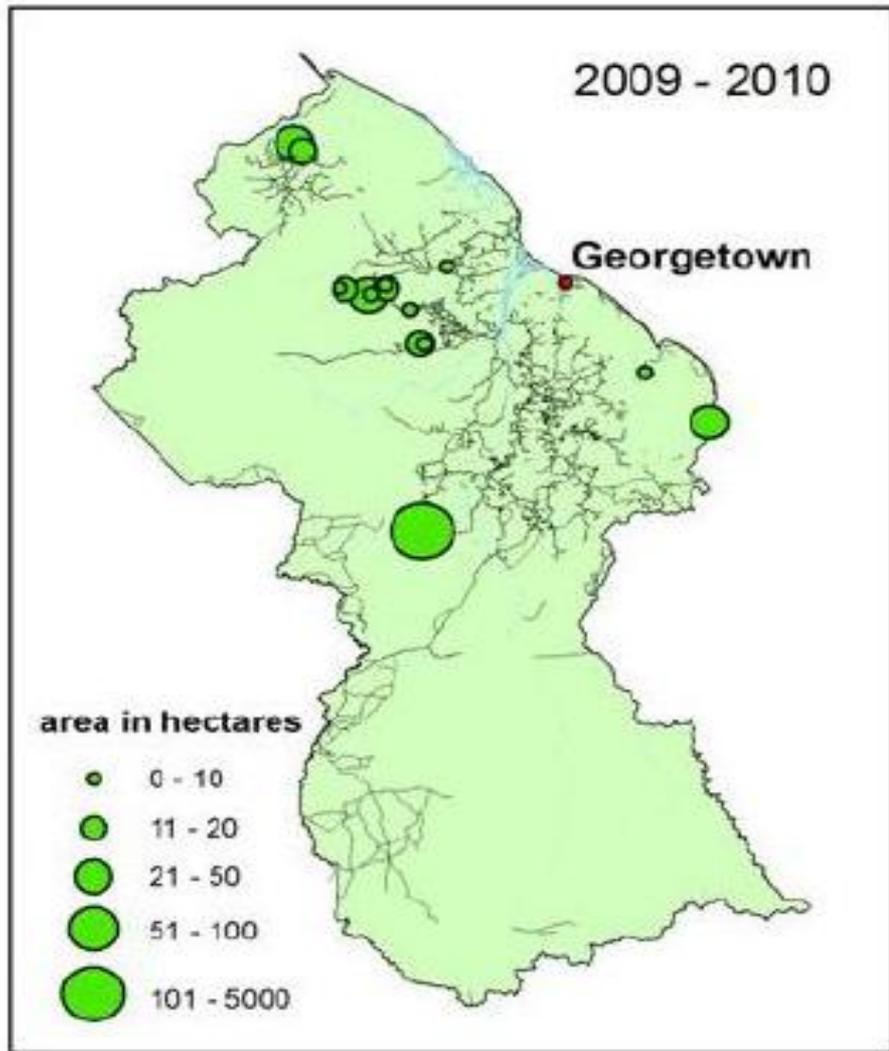
Historical & Year 2 Forest Change



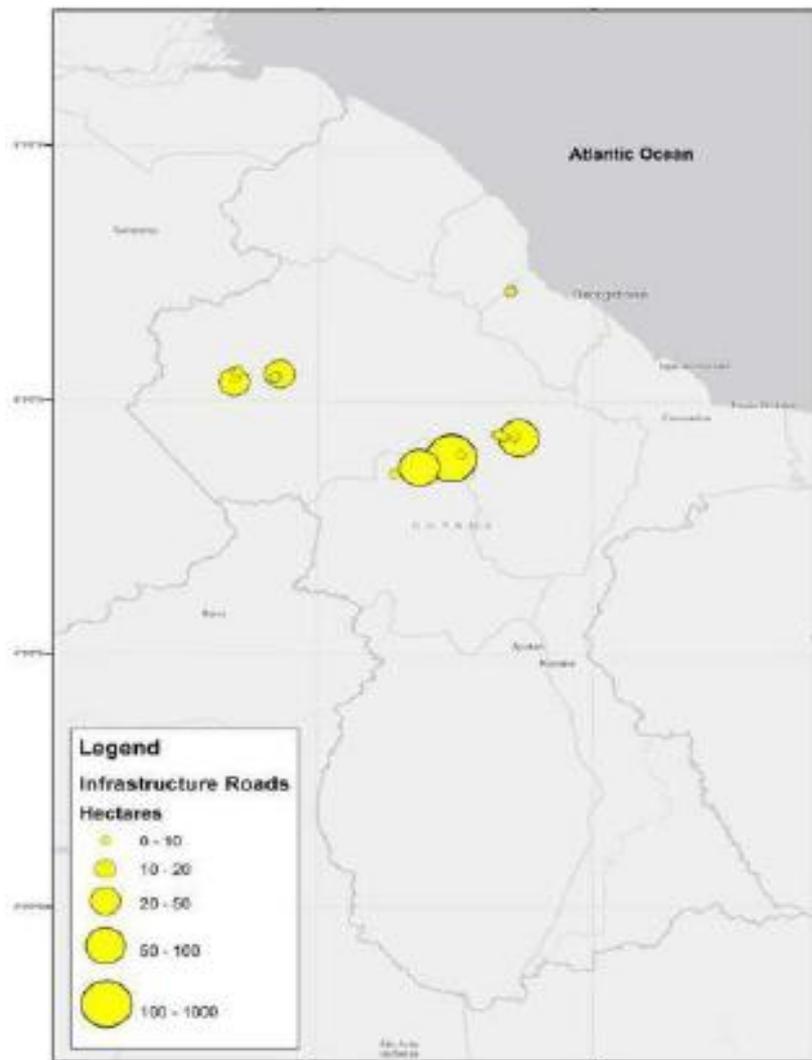
Mining: Spatial & Temporal Distribution for Years 1 & 2



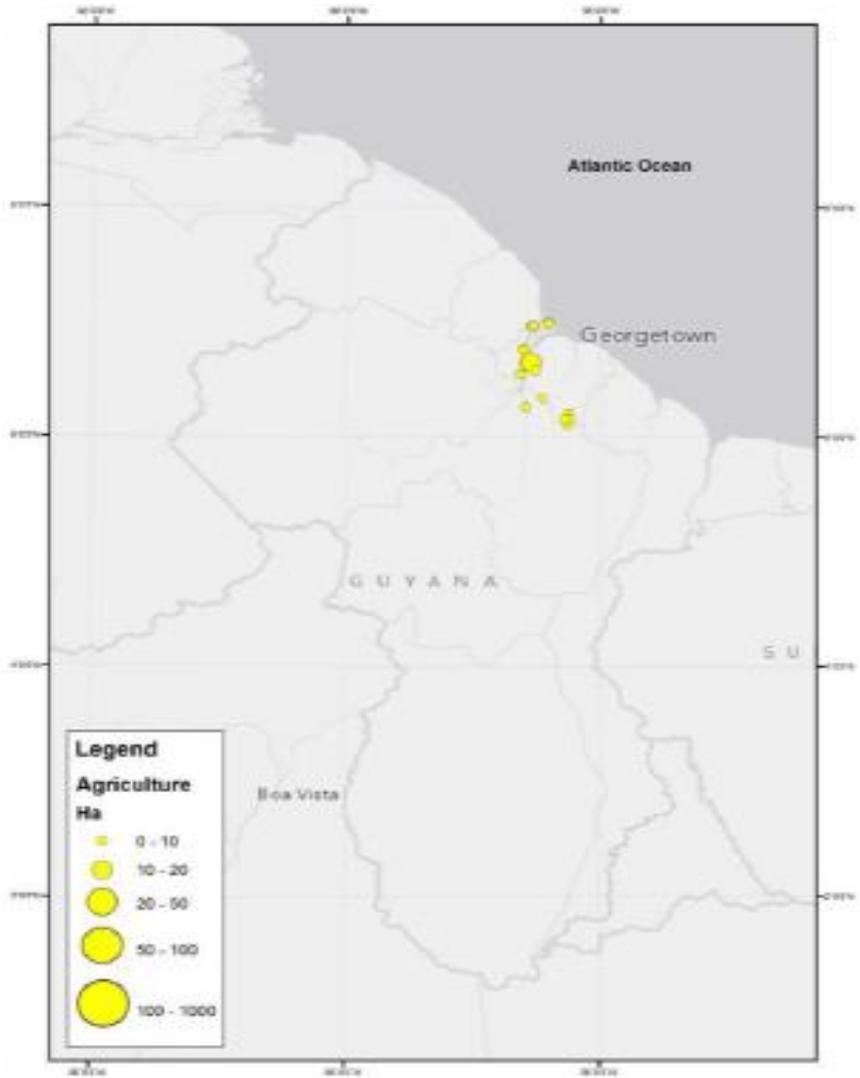
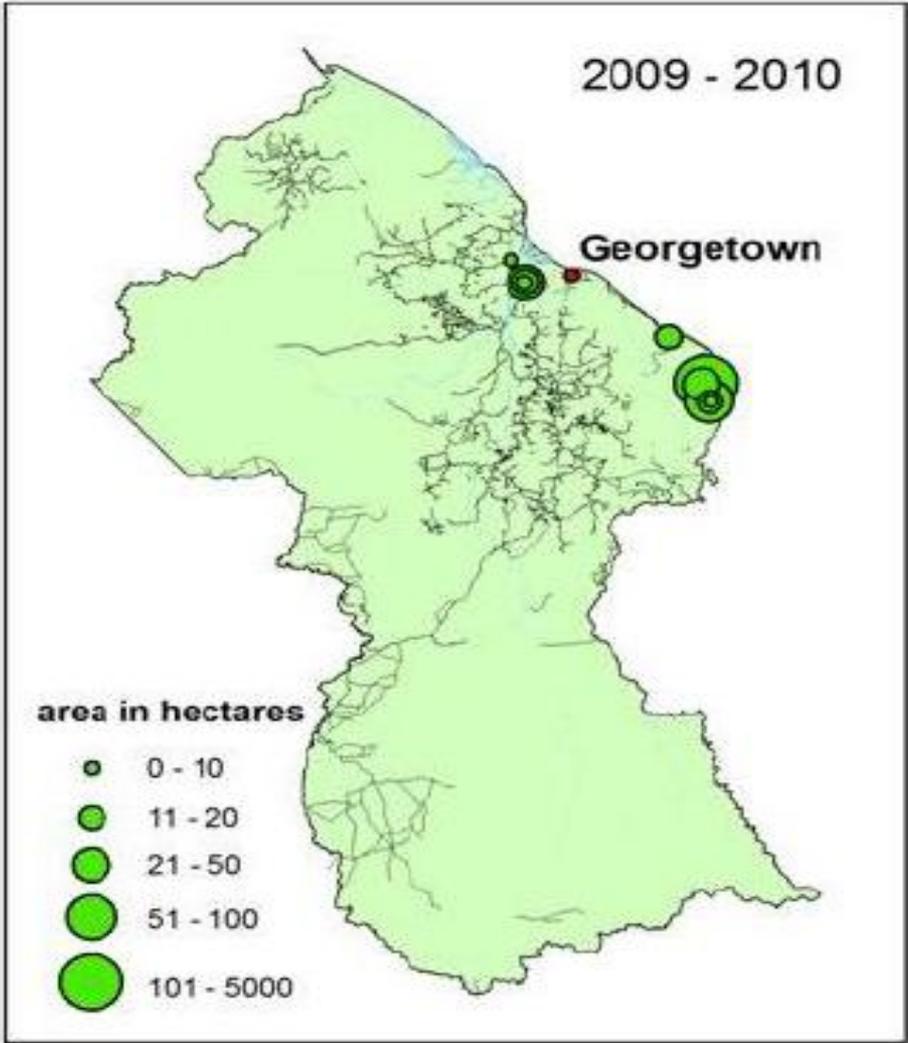
Forestry: Spatial & Temporal Distribution for Years 1 & 2



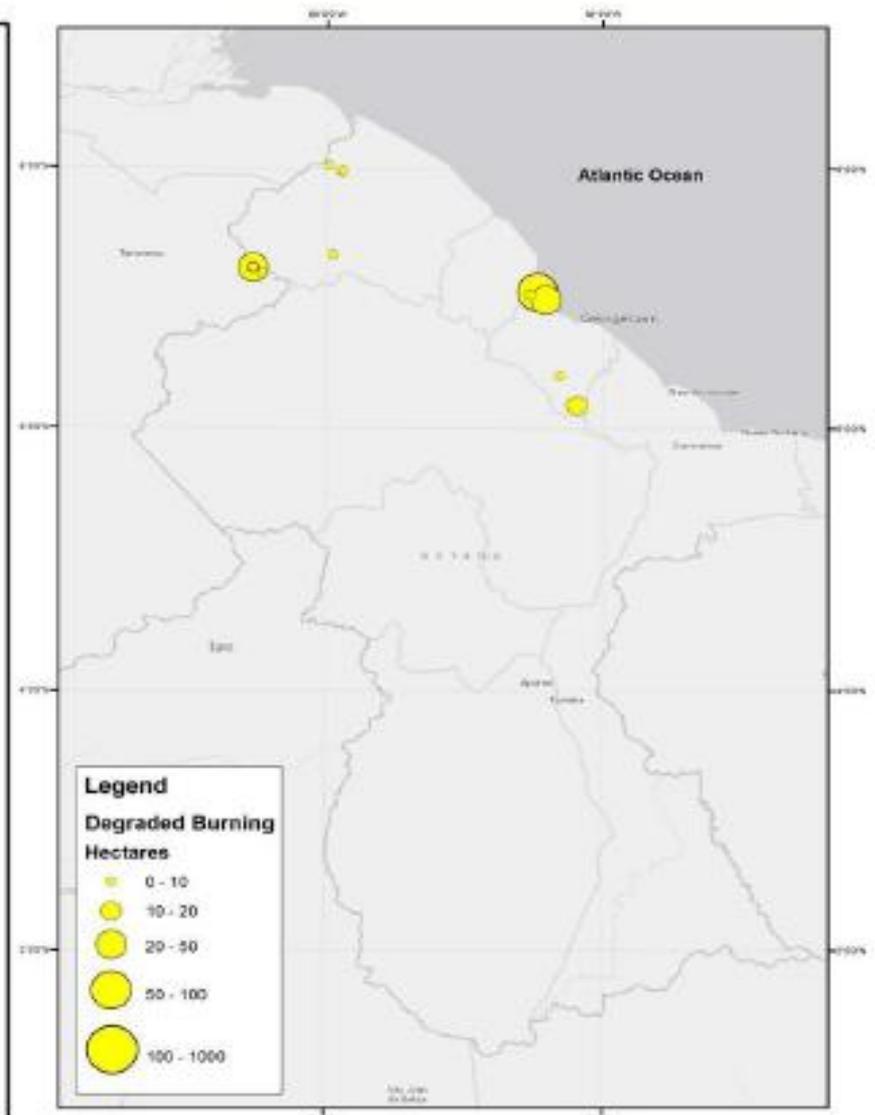
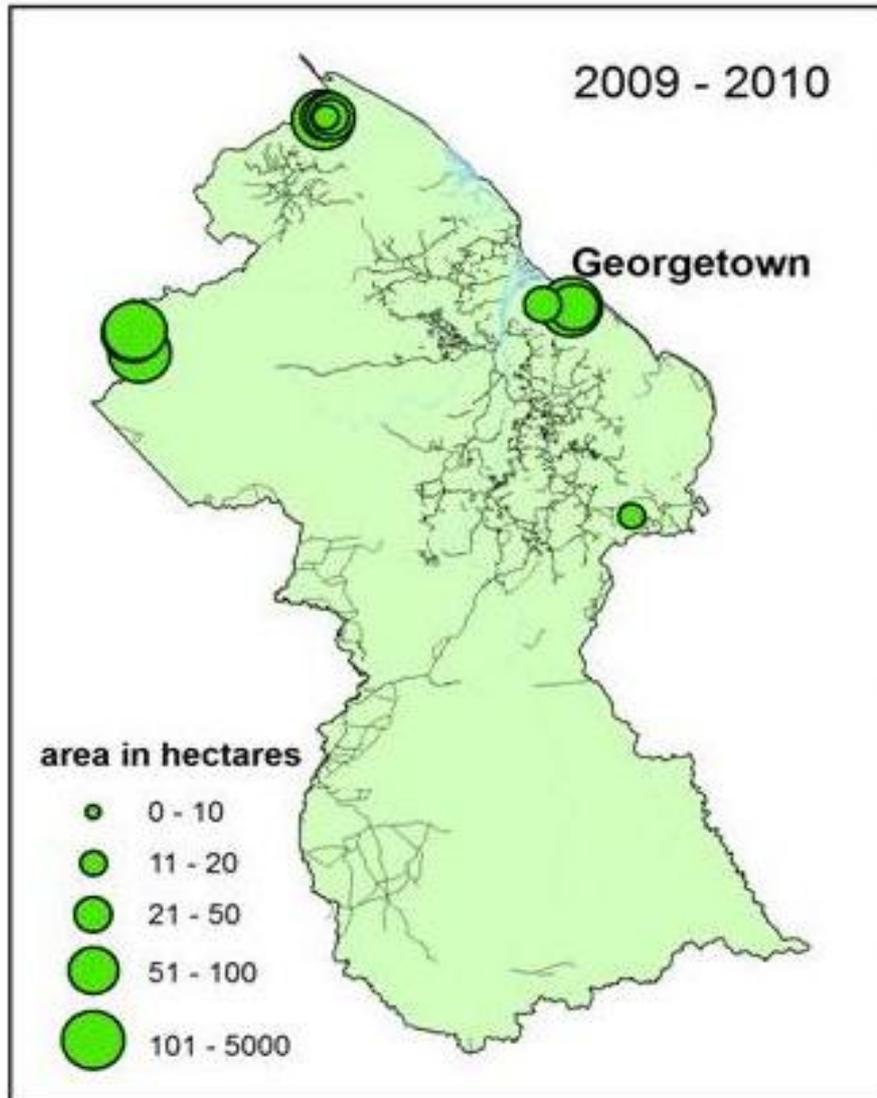
Infrastructure: Roads Year 2



Forestry: Spatial & Temporal Distribution for Years 1 & 2



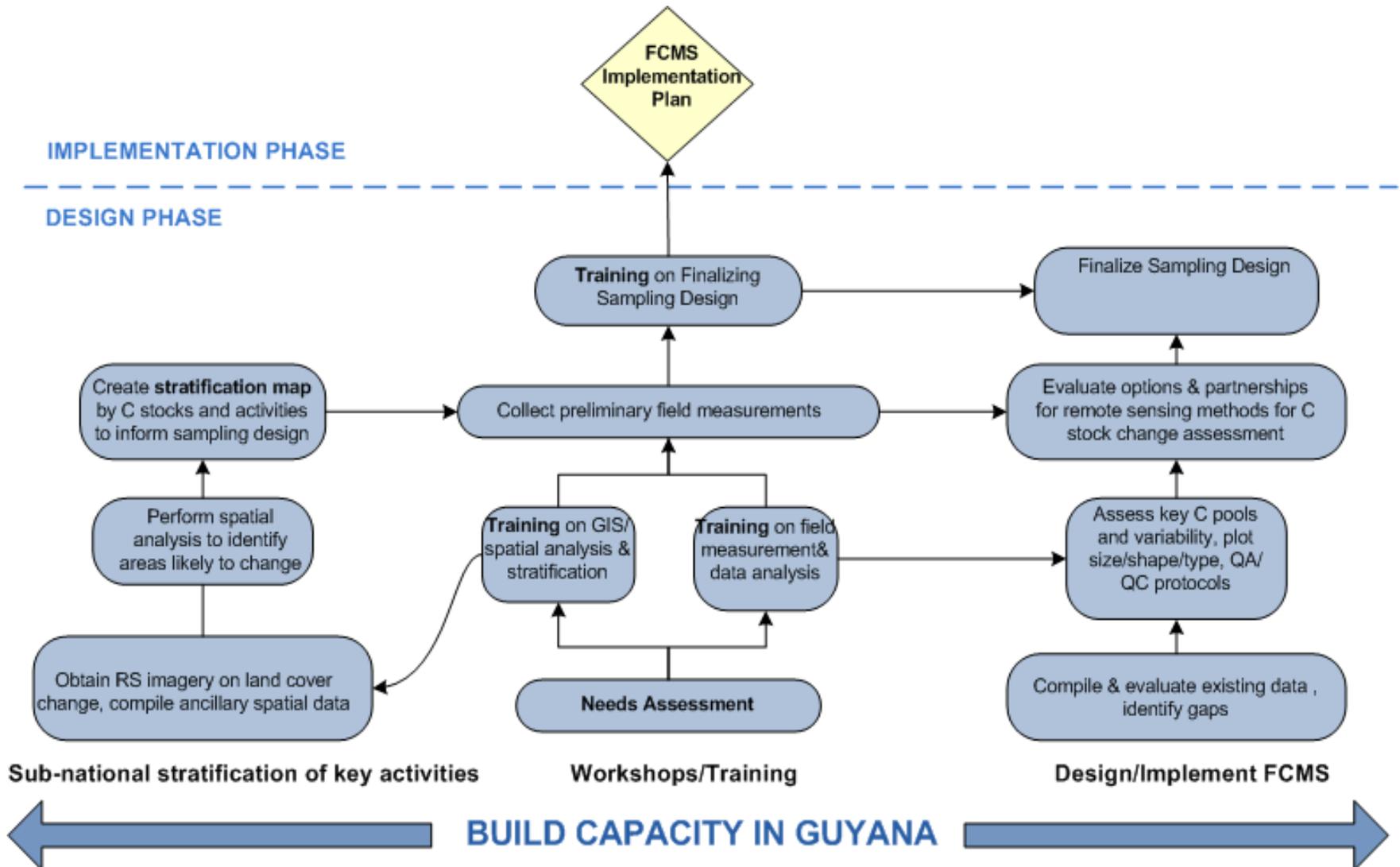
Biomass Burning: Spatial & Temporal Distribution for Years 1 & 2



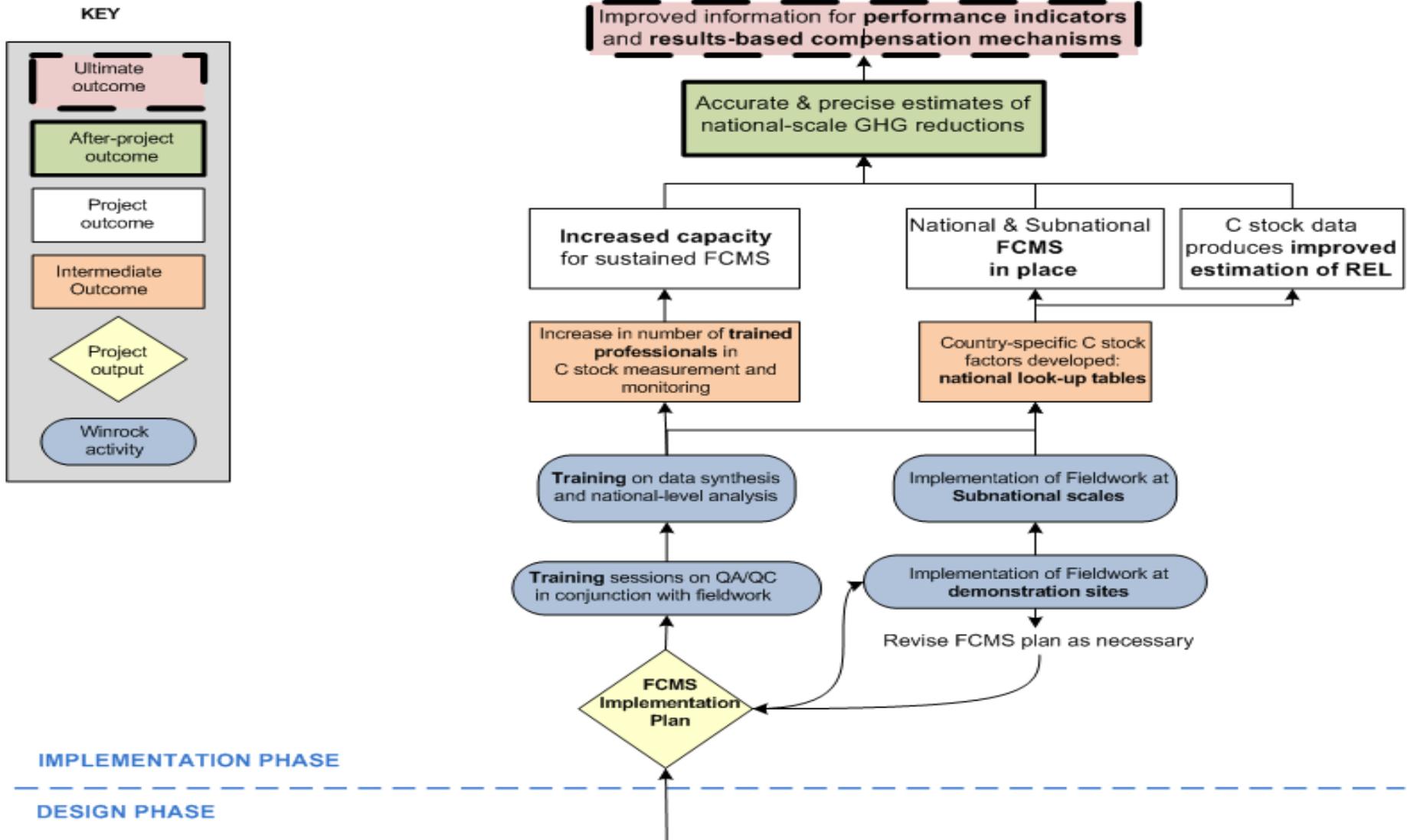
Forest Carbon Monitoring System (FCMS)

- Aim is to design and implement a long-term, robust, and scientifically sound national forest carbon measurement and monitoring system (FCMS)
- Data generated from C stock work will be linked to the forest area assessment effort to provide historic emissions (RL) and estimates of annual carbon emissions and removals (MRV)

Phase 1- Design of the FCMS



Phase 2- Implementation of FCMS



Key outcome of FCMS: national lookup tables of emission factors to meet standards

- Standards for level of uncertainty (e.g. precision of ground data)
- Produce QA/QC plans for all data collection and analyses

Stratum	Change agent/Driver – Deforestation (stock change)				
	Mining (>1 ha in size) (t CO ₂ e ha ⁻¹)	Infrastructure (t CO ₂ e ha ⁻¹)	Logging Infrastructure (t CO ₂ e ha ⁻¹)	Agriculture (t CO ₂ e ha ⁻¹)	Fire (t CO ₂ e ha ⁻¹)
Mixed forests high potential for change					
Mixed forest medium potential for change					



**Guyana's Experiences in Building Capacities for
National Forest Monitoring for REDD+ Monitoring
Reporting and Verification (MRV)**

Start-up Activities

- In the initial development of the MRV System some key lessons learnt were:
 - The need for the involvement of key natural resources management agencies- in Guyana's case, these were the Guyana Geology & Mines Commission (mining), the Guyana Lands & Surveys Commission (land administration & agricultural leases), the Guyana Forestry Commission (forestry) & the Environmental Protection Agency (environmental management)
 - The need for an operational unit to oversee, work along with consultants in development of the MRVS and eventually fully operate the MRV System- the REDD Secretariat
 - Need for a multi-stakeholder involvement to oversee the process- the MRVS Steering Committee. Comprises representatives of:

GFC	Forest Producers Association (FPA)
Guyana Geology and Mines Commission (GGMC)	Guyana Gold and Diamond Mining Association (GGDMA)
Environmental Protection Agency (EPA),	Ministry of Amerindian Affairs
University of Guyana (UG)	National Toshias Council (NTC)
Guyana Lands and Survey Commission (GLSC)	

- The primary function of the Steering Committee is that of overseeing the development and implementation of Guyana's MRV System. The Steering Committee is tasked with monitoring and reviewing the status of various aspects of the MRV System development, as well as provide oversight of project deliverables.

Technical Components

- To ensure of the success of the MRV System, a key area is that of capacity building in order to ensure the sustainability of the work done. Firms are required to train staff of the GFC, GGMC, GL&SC, EPA & UG on all aspects of their respective work plans
- Technical sub committees are important. Accompanying the MRVS Steering Committee, is a Technical Committee for this purpose. This not only support data sharing needs, but also sharing of experiences, transfer of knowledge and technology. This committee comprises technical personnel from the 4 key natural resources management agencies (GFC, GGMC, GL&SC, EPA).
- In initiation of work for the Year 1 Forest Area Change Assessment under the MRV System, a key lesson was that of the need for integration of the national datasets amongst the key natural resources management agencies as well as development of protocols for data sharing and storage.



What Factors that have led to Success in Improving Capacities and those that limit progress?

What worked for Guyana

- Significant financial incentive
- Clear mandate for implementing agency (GFC) and REDD Secretariat under Office of President
- Commitment and strong leadership from GFC and REDD Secretariat and responsiveness of all staff
- Technical staff committed, learn quickly, fully engaged, and work hard in field
- Cooperation and transparency among all relevant land-based ministries and agencies (Lands and Surveys, Mines and Geology, Agriculture)
- Capacity building built in to all level of activities for staff and relevant agencies at all levels

Recommendation for improving national forest monitoring and REDD+ MRV capacity development, and other urgent REDD+ MRV issues

- Identification of priorities and opportunities for improving forest monitoring and capacity building
- Coordination- A high-level national coordination and cooperation mechanism is needed for both improving national forest monitoring and REDD+ & MRV capacity nationally:
 - – a National MRVS Steering Committee was established for coordination and overseeing implementation of all activities of the MRV System
 - the implementation of the MRV Roadmap
- Establishment of partnerships- ESRI, CCI



Thank You