

5th Asia-Pacific UN-REDD Lessons Learned Meeting on National Forest Monitoring Systems (NFMS) & Reference Levels in the context of REDD+ organized in Hanoi during 20th- 22nd October 2014

Tour Report

Shri Subhash Chandra, DIG Forests, Forest Policy

BACKGROUND

REDD+ is envisaged as a mechanism for voluntary participation by developing (non-Annex 1) countries. The UN-REDD programme is a joint initiative of the 3 agencies FAO, UNDP and UNEP, which draws upon the unique expertise of each to provide support for any non-Annex 1 countries which are considering participating in a future international REDD+ mechanism. It aims at capacity development and strategy development, so that countries will be ready to implement REDD+ when the opportunity comes.

REDD+ decisions under the UNFCCC request developing countries choosing to implement REDD+ to develop a National Forest Monitoring System (NFMS) and a national Reference Emission Level (REL) or forest Reference Level (RL). An NFMS enables countries to collect information required to provide measurable, reportable and verifiable estimates of emission reductions and/or removals that occur as a result of the implementation of REDD+ activities. RELs and RLs are a way for a country which is undertaking REDD+ actions to show its plan for reducing net emissions of greenhouse gases over time. Many countries have made significant progress in developing NFMSs, including components on forest inventory and satellite land monitoring systems. This workshop was part of a series of regional events around the world, organized by UN-REDD, FAO and supported by USAID and other international partners. It is also part of a series of 'lessons learned' workshops for Asia-Pacific participants including the SilvaCarbon building upon the 4th workshop by focusing on the monitoring functions of the NFMS, and the development of RELs and RLs.

Over 90 participants from various Asia Pacific countries included **forestry and remote sensing experts** familiar with monitoring, evaluation and assessment practices within the forest and land-use sectors with knowledge of the use of remote sensing tools in the forest sector.

The key objectives of the meeting were:

1. To improve the understanding of the key components and approaches on NFMS for REDD+ and share relevant experiences between countries from across the region;
2. To bring national partners up to date on the UNFCCC guidance to develop a national REL or forest RL, and share approaches and examples that countries may find useful from demonstration activities/initiatives or formally submitted to the UNFCCC;
3. To provide an opportunity for information exchange and joint learning across countries in the Asia-Pacific region on NFMS and RELs for REDD+; and
4. To identify capacity gaps in NFMS and RELs development to help plan follow-up activities for support at regional and national levels.

Resource Persons:

1. Mr Adam Gerrand, UN REDD- NFMS
2. Mr Ben Vickers of FAO
3. Mr Julian Fox, FAO/UN-REDD

4. Ms Marija Spirovska Kono of SilvaCarbon
5. Ms Inge Jonckheere, FAO/UN-REDD
6. Ms Amanda Whitehurst, US Forest Service
7. Ms Andy Haywood, UN-REDD Pacific
8. Mr Baku Takahashi (JICA SUSFORM-NOW)
9. Mr Pham Thanh Nam (USAID LEAF)

I. Presentations and discussions:

1. Day 1 Monday 20 October

In the Inaugural Session brief introduction on the objectives was made and participants were introduction was done. Welcome and opening comments were made by Dr Nguyen Phu Hung, Director of DOSTIC and Director of Vietnam REDD Office, Viet Nam and Mr Jong Ha Bae, FAO Representative, Viet Nam.

A presentation was made on Viet Nam's National Forest Monitoring System: introducing the NFIMAP, NFI&S and FORMIS, and how VNFOREST aligns these different systems. This was followed by another presentation on UN-REDD NFMS workshop series and Objectives of workshop. Participants' expectations were discussed by Adam Gerrand, FAO/UN-REDD.

(i) Technical Session 1 NFMS for REDD+: Latest International Guidance

The Opening presentation on Revisiting NFMS: Focus on the Monitoring Functions was made by Mr Ben Vickers, FAO/UN-REDD. Subsequent presentation on The Warsaw Framework; The REDD+ Rule Book under the UNFCCC was made by Mr Julian Fox, FAO/UN-REDD who also conducted an exercise Guided multiple choice quiz on UNFCCC decisions for NFMS and FREL.

(ii) Technical Session 2 covered the Topic- Sub-national and national approach for monitoring policies and measures: Remote Sensing Tools which was facilitated by Marija Kono, SilvaCarbon

The opening presentation on Remote sensing in the REDD+ context: lessons learned and way forward was made by Ms Inge Jonckheere from FAO/UN-REDD. The second presentation on Options and limitations of emerging technologies for operational forest monitoring with focus on Lidar was made by Ms Amanda Whitehurst from US Forest Service. These were followed by Country case studies on the topic.

- (iii) Following Country case studies were presented by following experts
- a. Philippines by Wevina Manuel, NAMRIA
 - b. Bhutan by Arun Rai, Forest Resource Management Department, Bhutan
 - c. Cambodia by Leng Chivin, Forest Administration, Cambodia

2. Day 2 Tuesday 21st October

(iii) Technical Session 3: Sub-national and national approach for forest monitoring and dissemination of results:-

The opening presentation on National forest monitoring web portals- Focus on the monitoring functions was made by Inge Jonckheere, FAO/UN-REDD. The presentation covered introduction to new technologies like LIDAR and information on various Open Access

Software such as OpenForis, Regional portals which are being increasingly used for monitoring of forest cover/ carbon etc. This was followed by a presentation on Regional case study 2: Pacific region web portal status by Andy Haywood, UN-REDD Pacific and a Country case study presented by Mr Sameula Lagataki, Fiji Forest Service

(iv) Technical session 4 Participatory Forest Monitoring facilitated by Mr Akiko Inoguchi, FAO/UN

Mr Ben Vickers made the opening presentation on PFM in the context of NFMS for REDD+ highlighting the role of local communities in implementing NFMS. Following Country case study presentations were made on the topic

- 1: Viet Nam Participatory Forest Carbon Monitoring by Dr Bao Huy, Tay Nguyen University
- 2: Nepal by Shyam Paudel
3. Philippines by Grace Balawag, Tebtebba

(v) Technical Session 5: Forest Reference Emission Levels/ Reference Levels –latest international guidance.

Opening Presentation on Introduction to Forest Reference Emission Levels (FREL/FRL) and UNFCCC decisions was made by Julian Fox which described the process of deciding FRL/ FREL. It was informed that Brazil has become the first country to submit its FREL/ FRL, which are being studied by experts. Thereafter a Collaborative exercise on FREL/FRL methodology was conducted by Jullian Fox and Adam Gerrand for the participants.

Country case Studies presented by

- a. Vietnam – Establishing FRLs for the Provincial REDD+ Action Plan of Lam Dong Province, Viet Nam by Mr Tran Van Chau (USAID LEAF)
- b. Viet Nam - JICA's experiences with REL and database development in Dien Bien Phu.
- c. Indonesia: Pak Budi, Ministry of Forests, Indonesia
- d. Papua New Gunia by Mr Gwen Sissou, Office of Climate Change and Development, PNG

3. Day 3 Wednesday 22nd October

(vi) Technical Session 6 RELs/Forest Reference Levels – The Session provided the opportunity of sharing national experiences among the participants.

(vii) Technical Session 7 was devoted for Discussion groups on main workshop topics:

Discussion groups among participants on following topics were made to have detailed discussions:

- a. Remote Sensing tools for Monitoring of REDD+ Actions, Policies and Measures
- b. Participatory Forest Monitoring in the context of REDD+
- c. Forest Reference Emission Levels

Finally the workshop evaluation by participants was moderated by Mr Adam Gerrand who also answered questions and explanation by Adam and participants were asked to fill in the short on-line questions

II. Brief on discussion held in the meeting:

- i. NFMS for REDD+ latest International Guidance, Warsaw Framework & REDD+ Rule Book under UNFCCC.
- ii. Sub-National & National Approaches for monitoring policies & measures, forest monitoring and dissemination of results- National Forest Monitoring web portals
- iii. Remote Sensing tools for REDD+, Global Products- OpenFORIS, LIDAR etc for forest cover monitoring
- iv. Discussions- case studies of Viet Nam, Philippines, Bhutan & Cambodia
- v. Pacific Region web portal & Fiji case study
- vi. Participatory forest monitoring in the context of NFMS & REDD+- case studies of Viet Nam and Nepal
- vii. Forest Reference Emissions Levels/ Reference Levels- latest International Guidance National experiences of Viet Nam, Indonesia, Papua New Guinea
- viii. Collaborative exercises for helping participants about concepts and practical situations

III. OUTPUTS/RESULTS

- (i) A better understanding of a NFMS and forest RL for REDD+ and clarity in the design and implementation of national NFMS and RELs/RLs.
- (ii) Shared relevant experiences with other countries.
- (iii) Discussed UNFCCC guidelines to develop REL/FREL.
- (iv) Discussion on the current state of preparedness; assessment of the issues, capacity & knowledge gaps in NFMS and RE/ REL and the road map to achieve REDD+ objectives.
- (v) Inputs for updated UNREDD+ Rule Book

IV SUGGESTED ACTIONS:

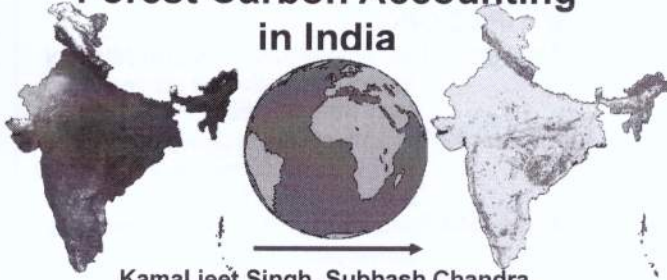
- i. India is still not a member of UN REDD+ which has 56 member countries.
- ii. Asia Pacific Region-16 Countries- Fiji New entrant
- iii. Approval of REDD+ Draft National Policy & Strategy
- iv. UN REDD is a 'REDD+ Readiness' programme. Joining UNREDD and WB FCPF would help in sustained interest and preparedness. No obligations for India for joining. Simple joining Process being member of FAO.
- v. UNREDD is willing to work with India. India's involvement in the UN-REDD programme will be important particularly from the perspective of south-south learning. India's long experience with forest monitoring systems is unique in the Asia Pacific region, and India can become a hub for technical capacity development initiatives in partnership with UN-REDD.

A copy of the presentation made in the UNREDD Meeting is enclosed at A-I and a brief presentation on Tour is placed at A-II.

(Subhash Chandra)



RS & NFI IN Forest Carbon Accounting in India



Kamal jeet Singh, Subhash Chandra
Ministry of Env. Forest & CC
21st October 2014, Hanoi



India's Forestry Scenario at a Glance

- India's geographical area is 328 m ha, human pop. over 1 billion. India is the second most populous and seventh largest country in the World
- India's forests constitute 2% of World's forests but sustain the needs of 17% of human and 18% livestock population of the World
- Per capita forest 0.064 ha. (World avg. 0.64ha.)
- About 5% of geographical area (or 16 m ha) covered under 572 Protected Areas
- Recorded Forest Area: 77.18 m ha (23.48% of GA)
- Forest Cover: 69.79 m ha (21.23 % of GA); Tree Cover: 9.1 m ha (2.78% of GA)
- Forest & Tree Cover: 78.92 m ha (24.01 % of GA)



REDD+ Action

- India contributed in evolving REDD+ concept, maintains that C is one of the products in the basket of multiple benefits from Forests.
- For awareness and capacity building on REDD+ Organised a series of national and international workshops
- 2011- 2 National Workshop, 4 Regional Workshop
- 2012- 2 National Workshop, 2 international Workshop
- 2013- Preparation of REDD+ reference level document
- 2014- Preparation of REDD+ National Policy & strategy document.
- **USAID-Forest PLUS**
- FP works closely with MoEF&CC, SFDs and communities to support REDD+ activities
- **Expected results** – Developing tools, techniques & approaches . deployment for taking REDD+ action to scale
- Support REDD+ readiness activities & approach to implement REDD+



Reporting of GHG inventory for LULUCF

Six categories namely

- **Forest land,**
- **Cropland,**
- **Grassland,**
- **Wetlands,**
- **Settlements and**
- **Other lands**



Definitions

- **Forest** - Forest is defined structurally on the basis of
 - **Crown cover** percentage: Tree crown cover - 10 to 30 % (**India 10%**)
 - **Minimum area** of stand : area between 0.05 and 1 ha (**India 1.0 ha**), and
 - **Minimum height** of trees: Potential to reach a minimum height at maturity in situ of 2 to 5 m (**2m**)

- (Decision 19/CP.9) - Kyoto Protocol definition)



Approaches for activity data

Three different approaches are given in the IPCC GPG

Approach1: Total area of each land-use category but no information on conversions (only net changes)

Approach2: Tracking of conversions between land-use categories (only between 2 points in time)

Approach3: Spatially explicit tracking of land-use conversions over time

Preparing for REDD+ Approach 3



Tiers that are used for the emission factors

Tiers for emission factors: change in Carbon stocks

Tiers 1: IPCC default values

Tiers 2: Country specific data for key factors

Tiers 3: Detailed national inventory for key C stocks, repeated measurement for key stocks through time or modeling

Preparing for REDD+ tier 3 Phase.



Methodologies for Assessing 'Activity data'

Three different methodologies

- Wall-to-wall mapping using remote sensing data
- Mapping of sampled areas using remote sensing data and
- Using field survey methods



Stratification of Forest area

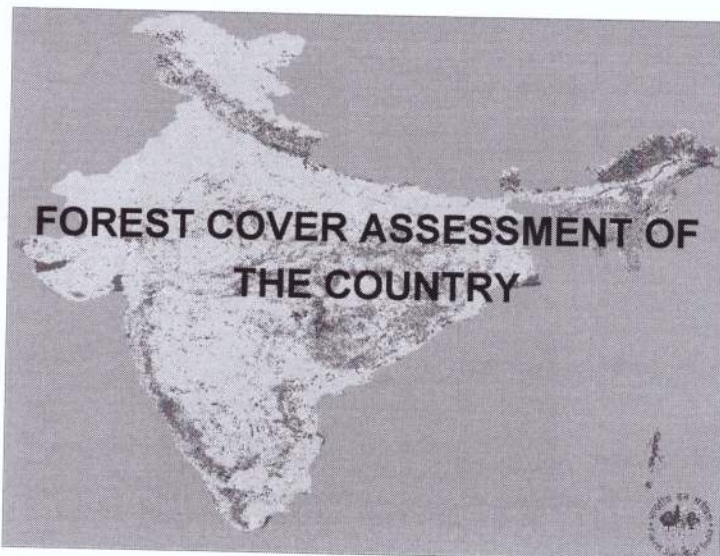
Forest carbon stock depends upon

- Canopy density
- Forest type
- Aspect
- Altitude



Assessment of Forest Carbon Stock for India

- Forest cover maps,
 - Forest types maps,
 - National Forest Inventory,
 - Estimation of missing components of forest biomass, and
 - Integrating the above four components to estimate the forest carbon and change
- For estimation and stratification of 'Activity data'
- For developing 'Emission factors'



Forest Cover and change Assessment

INPUTS

- Satellite data of the entire country from National Remote Sensing Centre (NRSC) IRS-P6 LISS III (23.5m spatial resolution)
- SOI Topographic sheets - 1: 50,000

METHODOLOGY

- Digital / visual Interpretation
- Ground Verification
- Minimum mappable area is 1.0 ha

OUTPUTS

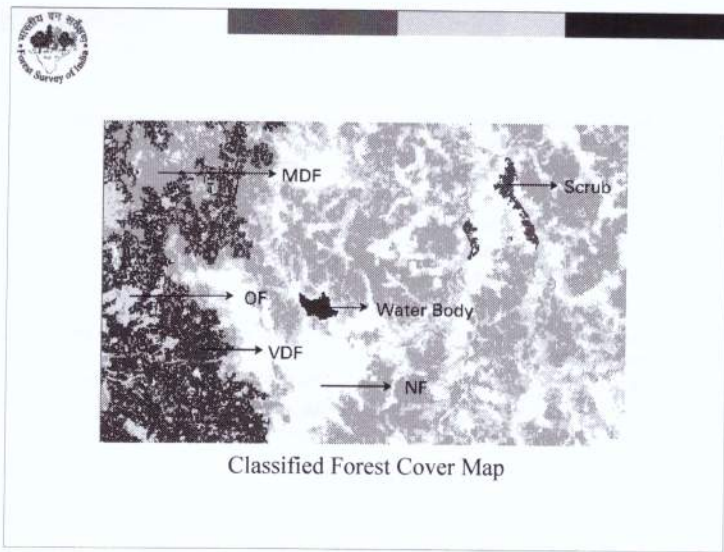
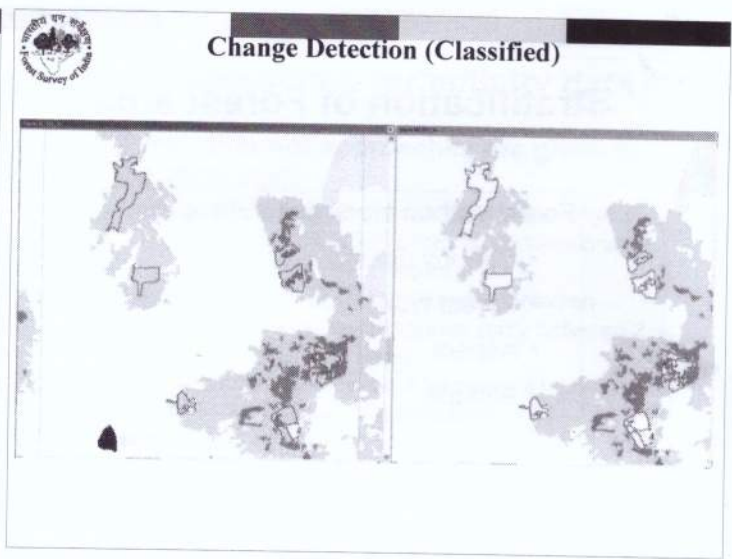
Forest cover maps on 1:50,000 scale in digital or hard copy form showing following forest cover classes:

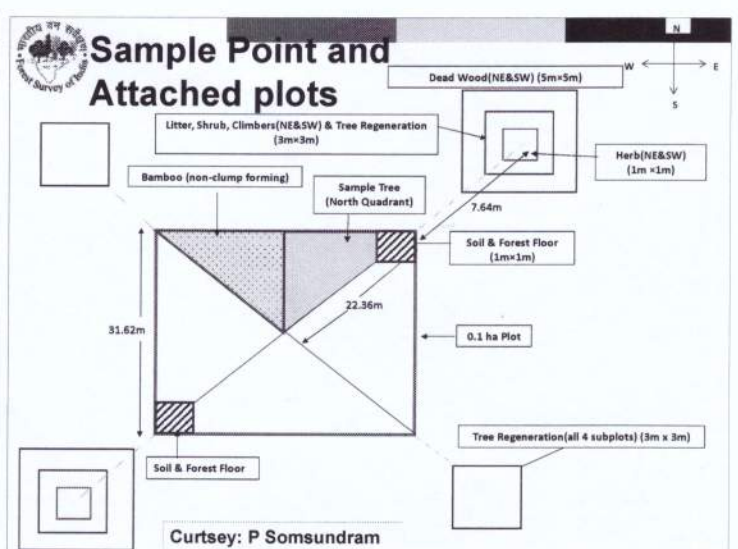
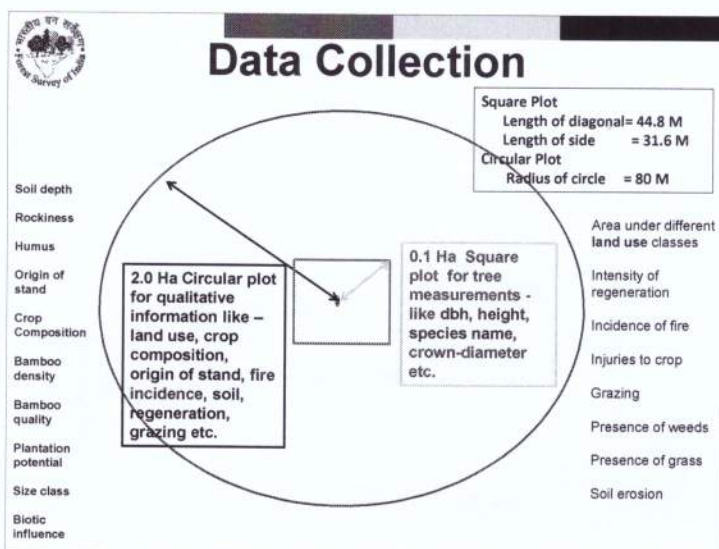
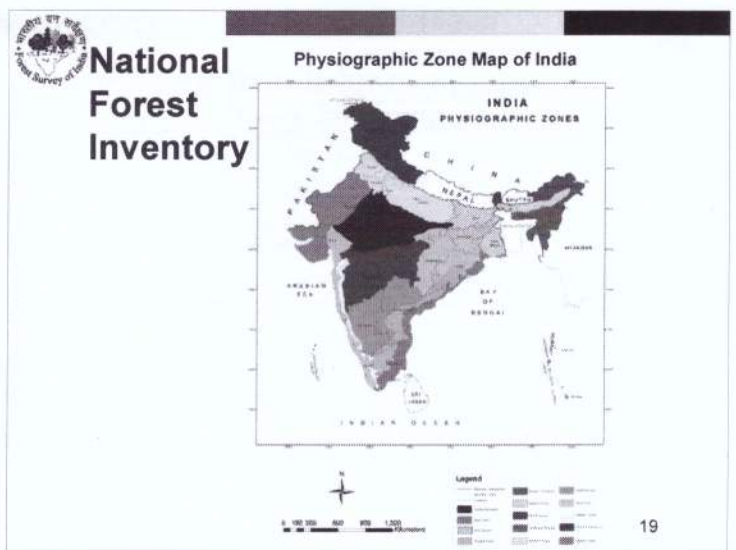
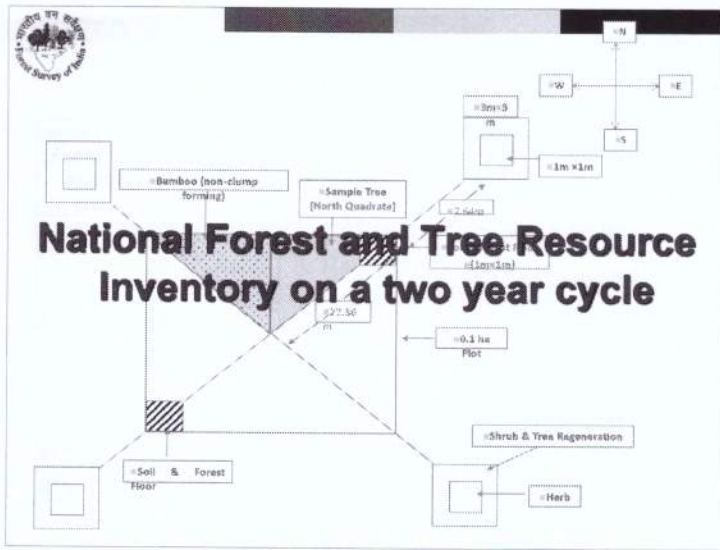
CATEGORY	CANOPY DENSITY
Very Dense Forest	More than 70% canopy
Moderately Dense Forest	40-70%
Open Forest	10-40%
Scrub	Less than 10% in forest lands

It takes almost two years to complete the assessment process

Details of Different Forest Cover Asses

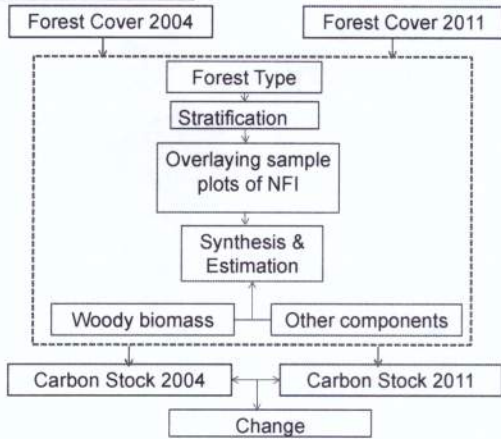
Assessment	Year	Period	Area (ha)	Percentage (%)
First	1987	1981-83	640,819	19.49
Second	1989	1985-87	638,804	19.43
Third	1991	1987-89	639,364	19.45
Fourth	1993	1989-91	639,386	19.45
Fifth	1995	1991-93	638,879	19.43
Sixth	1997	1993-95	633,397	19.27
Seventh	1999	1996-98	637,293	19.39
Eighth	2001	2000-01	6,53,898	19.89
Ninth	2003	2002-03	6,77,816	20.62
Tenth	2005	2004-05	6,77,088	20.60
Eleventh	2009	2006-07	6,92,394	21.05
Twelfth	2011	2008-09	6,92,027	21.05
Thirteenth	2013	2010-12	697,898	21.23







Approach for change



Change in forest carbon stock During 2004 - 2011

Carbon Pools	C Stock in 2004 (million tons)	C Stock in 2011 (million tons)	Percent carbon in pool	Net Change in C Stock (million tons)
Above Ground biomass	2101	2,192	31.6	91
Below ground biomass	663	694	10	31
Dead wood	25	27	0.4	2
Litter	121	130	1.9	9
Soil	3753	3,898	56.1	145
Total	6,663	6,941	100.0	278



5th Asia-Pacific UN-REDD Lessons Learned Workshop

National Forest Monitoring Systems (NFMS) & Reference Levels in the context of REDD+

Hanoi
20th- 22nd October 2014

Subhash Chandra & Kamaljeet Singh

REDD+ & its relevance to India:

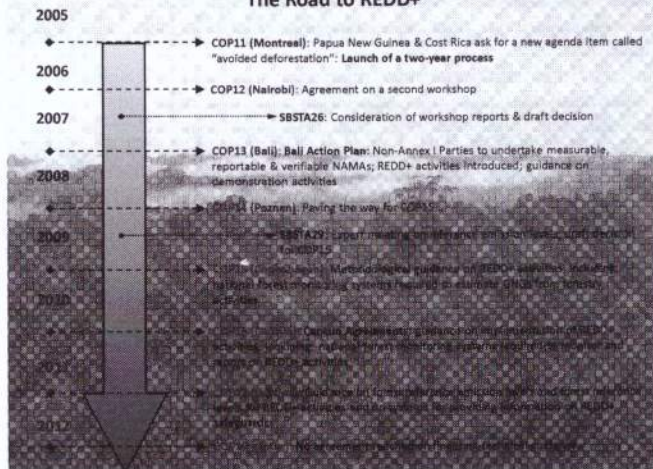
"developing country Parties to contribute to mitigation actions in the forest sector by undertaking following activities:

- Reducing emissions from deforestation;
- Reducing emissions from forest degradation;
- Conservation of forest carbon stocks;
- Sustainable management of forests;
- Enhancement of forest carbon stocks."

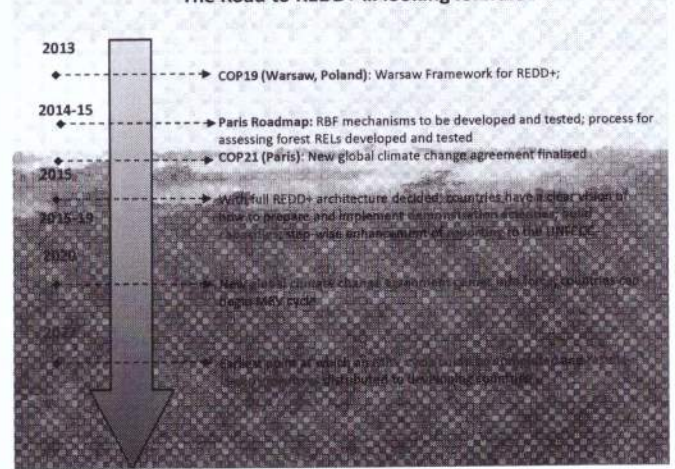
Benefits to India: India played key role in development of REDD+

- Expect compensation for its pro-conservation approach and SFM.
- Improvement in forest cover & enhanced forest carbon stock.
- Enhanced goods/ products and services from forests.
- Incentives/ Benefits for local communities involved in protection & conservation.
- REDD+ programme to help sequestration of additional 1 billion tonnes of CO₂ over next 3 decades and provide carbon service incentives.

The Road to REDD+



The Road to REDD+ ... looking forward



Discussions held on

- NFMS for REDD+ latest International Guidance, Warsaw Framework & REDD+ Rule Book under UNFCCC
- Sub-National & National Approaches for monitoring policies & measures, forest monitoring and dissemination of results- National Forest Monitoring web portals
- Remote Sensing tools for REDD+, Global Products- OpenFORIS, LIDAR etc for forest cover monitoring
- Discussions- case studies of Viet Nam, Philippines, Bhutan & Cambodia
- Pacific Region web portal & Fiji case study
- Participatory forest monitoring in the context of NFMS & REDD+- case studies of Viet Nam and Nepal
- Forest Reference Emissions Levels/ Reference Levels- latest International Guidance National experiences of Viet Nam, Indonesia, Papua New Guinea
- Collaborative exercise

REDD+ under the UNFCCC

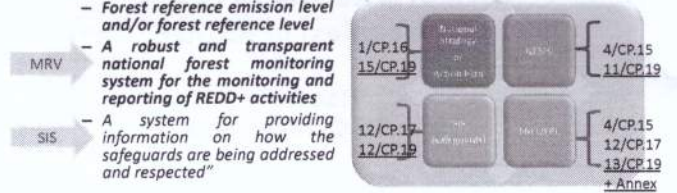
The Cancun Agreements (Decision 1/CP.16)

Elements to be developed

"...requested developing country Parties aiming to undertake the REDD+ activities, in accordance with national circumstances and respective capabilities, to develop:

- A national strategy or action plan
- Forest reference emission level and/or forest reference level
- A robust and transparent national forest monitoring system for the monitoring and reporting of REDD+ activities
- A system for providing information on how the safeguards are being addressed and respected"

The 4 Elements of the Cancun Agreement



UNFCCC: COP19 – Warsaw, 2013

“Warsaw Framework on REDD+”

Seven decisions on REDD+, to move forward with REDD+ Readiness

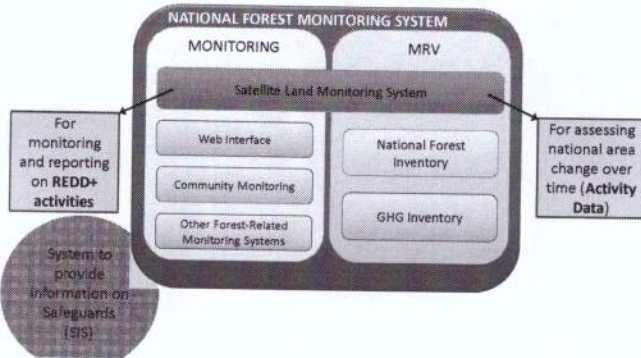
1. Addressing the drivers of deforestation and forest degradation.
2. Work programme on results-based finance
3. Modalities for measuring, reporting and verifying.
4. Modalities for national forest monitoring systems.
5. Coordination of support for the implementation of activities in relation to mitigation actions in the forest sector by developing countries, including institutional arrangements.
6. Guidelines and procedures for the technical assessment of submissions from Parties on proposed forest reference emission levels and/or forest reference levels.
7. The timing and the frequency of presentations of the summary of information on how all the safeguards...are being addressed and respected.

How to develop NFMS?

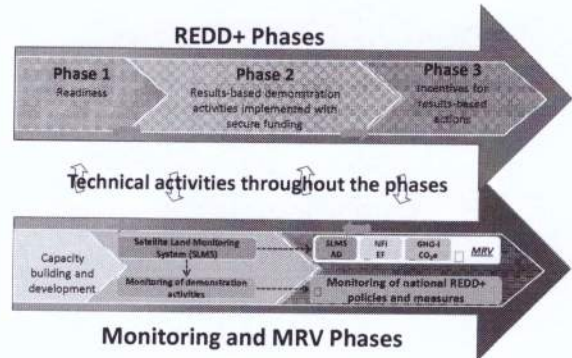
- **National Ownership**
- **Build on existing systems and capacities:**
- **Consistency with UNFCCC process:** integration of REDD+ strategies & NFMS with UNFCCC commitments, including for NAMAs
- **NFMS should be:**
 - Appropriate for national level implementation
 - Robust and transparent
 - In line with UNFCCC decisions on REDD+, including 1/CP.16, the Warsaw Framework and any future decisions
 - Complementary to existing forest inventory methods
 - Cost-effective (sustainable without REDD+ finance)
 - Consistent with the phased approach to REDD+

Functions of the NFMS

- NFMS' 2 functions in REDD+ context:
 - Monitoring (M) of Policies & Measures (PAMs)
 - Measurement (M) of MRV of emissions & removals
- Develop NFMS in a stepwise approach through 3 Phases of REDD+
- Fully operational in Phase 3, to allow for positive incentives under an international mechanism



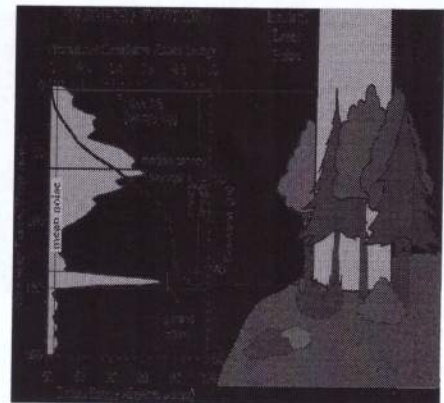
Phased implementation of the NFMS



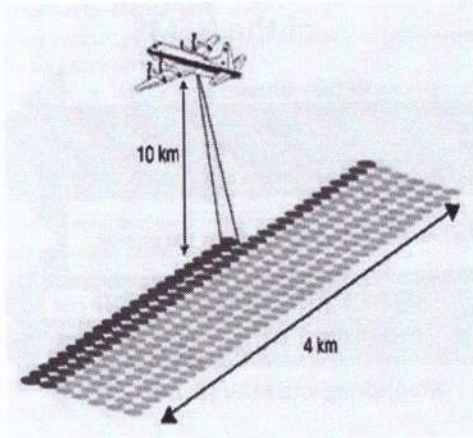
Open access database on forests & REDD+ activities

- National Forest Inventory plot data to be used for REDD+
- Land classification – maps showing land use, as interpreted from SLMS and ground truthing, to be readily accessible
- Forest management plans and activities, including those under a national REDD+ programme, or voluntary projects
- Open channels for feedback and correction
- Use of Information technology
- OpenFORIS Software an Open access database used in Tanzania, Zambia, and Terra Congo
- Active remote sensing- Application of LIDAR (Light Detection and Ranging)
 - Spaceborne
 - Airborne
 - Ground-based
- ICESAT, LVIS, SLICER, etc.

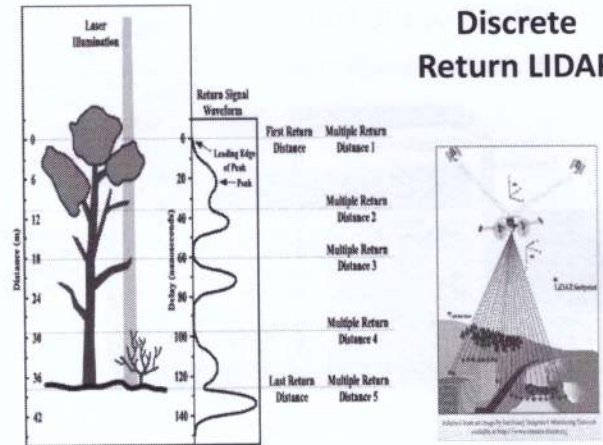
Waveform LIDAR



Laser Vegetation Imaging Sensor (LVIS)

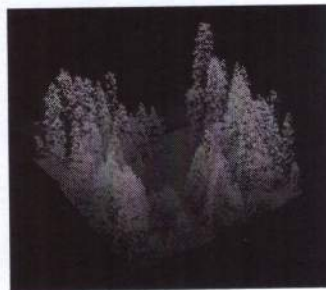


Discrete Return LIDAR



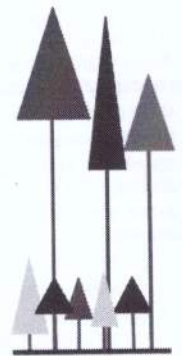
Information from the LIDAR data?

- Topography
 - Flood events: predictions and analysis
 - Erosion
- Forest Structure
 - Vertical structure
 - Stand structure and canopy cover
 - Habitat analysis and characterization
 - Biomass estimates/carbon stocks
 - Forest monitoring
- Fusion
 - Radar
 - Hyperspectral
 - Optical
 - Landsat/Modis

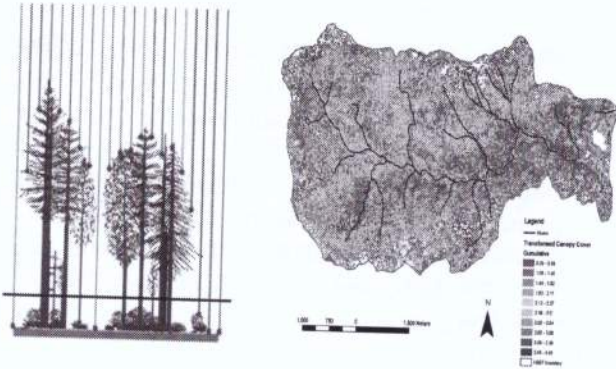


Forest Structure and Biomass

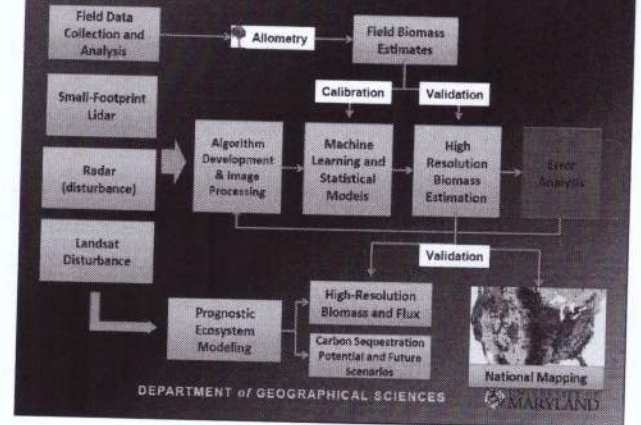
- Essential part of forest ecosystem dynamics
 - Plant species diversity
 - Plant growth
 - Animal species diversity and habitat
 - Biomass estimation
- Elements of vertical structure
 - Canopy height
 - Canopy cover
 - Layering
- Biomass determined from field work used to determine equations for AGB using LIDAR metrics
- Allometric equations
 - Equations that relate above ground tree biomass to specific tree measurements
- Typical LIDAR metrics used
 - Canopy height
 - Height of median return
 - Canopy cover



Canopy Cover



Methodological Approach



REDD+ "Forest Reference Emission Level and Forest Reference Levels" – what does it mean?

- REDD+ has defined FREL/FRLs as "benchmarks for assessing each country's performance in implementing REDD+ activities"
- UNFCCC has never defined the two concepts... The UN-REDD interpretation;

Forest Reference Emission Level (FREL)

Gross emissions from deforestation or degradation
Solely for activities that "reduce emissions"

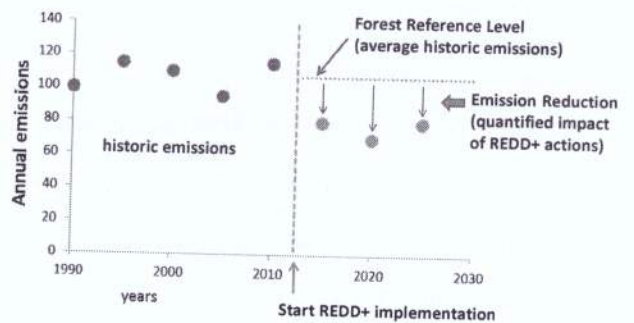
- Reducing emissions from deforestation
- Reducing emissions from forest degradation

Forest Reference Level (FRL)

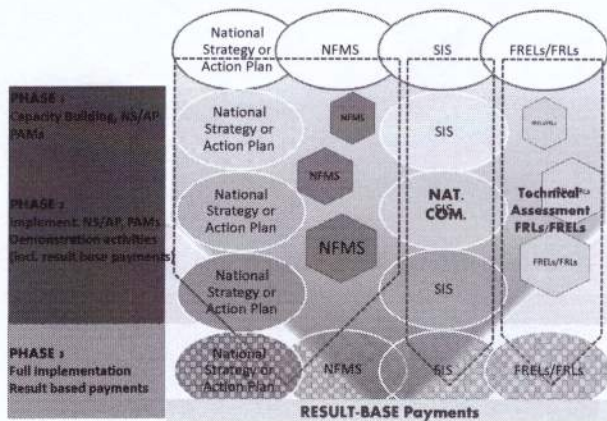
Net emissions and removals

Also includes activities from the "+" that can "enhance forest carbon stocks"

FREL/FRL graphical example



Summary- REDD+ implementation...



Learning from the meeting...

- Improved understanding on NFMS for REDD+
- Shared relevant experiences with other countries.
- Discussed UNFCCC guidelines to develop REL/FREL.
- Discussion on the current state of preparedness; assessment of the issues, capacity & knowledge gaps in NFMS and RE/REL and the road map to achieve REDD+ objectives.
- Working for updated UNREDD+ Rule Book

Immediate steps (for India)

- India is still not a member of UN REDD+ which has 56 member countries.
- Asia Pacific Region-16 Countries- Fiji New entrant
- Approval of REDD+ Draft National Policy & Strategy
- Joining UNREDD and WB FCPF would help in sustained interest and preparedness. No obligations for India for joining. Simple joining Process being member of FAO.
- UNREDD willing to work with India. India can become regional Hub for REDD+ capacity Building activities for UNREDD and APFC Region.