

# **2<sup>nd</sup> National Demonstrator Summit**

## **GEO Forest Carbon Tracking Task**

### **Meeting Summary and Action items**

**FAO HQ Rome, 7 February 2011**

Attendees; see agenda and presentations (<http://www.fao.org/forestry/fra/55919/en/>)

#### **1. Welcome**

José-Antonio Prado, Director of the FAO Forestry Department welcomed participants to the second National Demonstrator Summit of the GEO Forest Carbon Tracking (FCT) task.

Michael Brady, the FCT co-lead from Canada, chaired the introductory session and introduced the objectives of the summit, which were to:

- Build closer links between ND country authorities and ND Product Development teams
- Review the technical and programmatic achievements and challenges to FCT implementation in 2010
- Explore GEO-FCT - UN-REDD - FAO (FRA and NFMA) synergies
- Generate ND country action plans for GEO-FCT for 2011-2012

Giovanni Rum of the GEO Secretariat provided an overview of the GEO FCT task. This was followed by a presentation by Alberto Sandoval of the FAO on the UN-REDD programme.

The term Measurement, Reporting and Verification, and Monitoring (MRV&M), used by the UN REDD Programme was introduced and discussed. It was recognized such terms may take on different and more formal meaning in the ongoing UNFCCC negotiations.

The UN REDD Programme was encouraged to collaborate more closely with the GEO FCT task, its NDs and international partner organizations such as the Global Observation of Forest and Land Cover Dynamics (GOFC-GOLD).

#### **2. National Demonstrator Country Report Session**

Giovanni Rum reviewed the responsibilities of and benefits to the National Demonstrators involved in the FCT task. This was followed by brief country reports by ND representatives from Mexico, Colombia, Brazil, Guyana, Cameroon, D.R. Congo, Peru, Tanzania Indonesia, and Tasmania. A candidate ND country presentation was provided by Nepal. The reports included information on:

1. Forest types and conditions in the country
2. National importance of monitoring forest for carbon accounting
3. Forest and climate policy context
4. Program/framework within which FCT and carbon accounting fits
5. Existing monitoring systems and available data
6. Frequency of monitoring and spatial extent - current and desired
7. Current methods and associated issues
8. Institutional framework for REDD+, national plans, resources, international initiatives
9. Expectations of GEO FCT activities and support

Yukio Haruyama described the potential Japanese support for GEO-FCT within the REDD+ Partnership.

### **3. ND break-Out Work Session**

The NDs divided into 10 working groups, one for each National Demonstrator country, with participants from the ND authority and implementing agency, and the Product Development team leader or representative. The charge to the groups was:

- Information exchange between ND representatives and PD team on
- current status and expectations
- Informal discussions around seed questions
- Formulate action plan for 2011-2012 (define key activities with milestones and other details)

### **4. ND country action plans for GEO-FCT for 2011-2012 (reported at SDS#2)<sup>1</sup>**

Reports from the National Demonstrator country representatives were provided during the Science and data Summit, including action plans for 2011-2012. Highlights, discussions and key actions include:

#### **Mexico**

Fernando Paz (COLPOS) reported on product development progress in Mexico, including data availability and access from national sources for both remote sensing data and in situ validation data. He also reviewed the access to the recent remote sensing data provided by the FCT data provider agencies.

Demonstration products generated to date with task partners (Feb., 2011) using these data include national maps of: Vegetation Continuous Field; Forest / Non Forest Map; Growing Stock Volume; Biomass. Products over the verification sites include: land use 30 m cover maps; Satellite and ground data fusion (carbon density), including time series analyses and accuracy assessments.

Plans for 2012 include refining the products and creating time series from 1990 to 2011 for reference purposes. Testing is also planned of carbon budget models (CBM) in research sites, national C pools, and use of decay and assimilation rates now being measured.

Other ND plans and activities include Canadian and USA collaboration in:

- CarboNA – FCT project inclusion request (Feb 11)
- Mexico-Canada CBM follow-up meeting (FCT integration included) (Mar 2011)
- SAR capacity building/training (workshops, practical attachments, student exchange, post doc), 2011
- Expand partnership agreements (e.g., CSA in CMP for SAR support), April 2011
- Follow-up of North America coordination meeting (Feb 11) on national CBM, NFI and flux site network
- Support for S & C America FCT (south-south), second meeting in March/April 2011 (3-4 countries)
- Data initiative (GOFC-GOLD and USGS), mid 2011
- Establish data sharing agreements (use of FCT acquired EO & Mexico in-situ data), resolved in 2011

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<sup>1</sup> See also Meeting Summary and Action Items of 2nd SCIENCE AND DATA SUMMIT, FAO HQ, Rome, Italy: 8 - 10 February 2011, prepared by Don Ball

The meeting took note that Mexico is one of the few NDs that is advancing a national CBM system in the forest sector, and linking this to systematic remote sensing, in situ data collection and product development.

### **Colombia**

Gustavo Galindo (IDEAM) presented on the status and plans of FCT activities in Columbia, with a focus on enabling the technical institutional capacity to support REDD projects. He reviewed the expectations of GEO FCT activities and support, and emphasized the need for new EO data in a systematic and effective way, and capacity building in remote sensing activities, which will help for carbon accounting.

A forest monitoring system has been established, using coarse, moderate and fine resolution optical EO to produce forest cover change between 1990 and 2005. He noted that 25% of the country experiences frequent cloud cover and that use of SAR is desirable, but processing capacity is weak and data availability has been uncertain and costs are high. Current support by WHRC for SAR processing will help.

Demonstration activities to date include gathering 1990-2010 Landsat catalogs and pre-processing of new FCT radar data with WHRC. Four verification sites have been designated, with one prioritized for current in situ data collection. Planned activities include continued efforts to consolidate national GEO membership and agency participation in ND task activities, and capacity building in SAR processing for monitoring forest carbon.

### **Brazil**

Julio Dalge (INPE) described the forest clear cut and degradation monitoring programs in Brazil (PRODES, TerraAmazon, DETER), including their scope, methods, data use and verification approaches. He presented results of regular forest map production for the years 2007, 2008 and 2009. Results of recent mapping indicate that degradation represents almost double the area of that deforested. INPE is now processing 2010 data with results expected in May 2011.

Current actions at INPE contributing to the FCT task include investigations to refine degradation monitoring approaches; assimilate radar data; use of high resolution optical data for assessment; and policy work on EO data sharing. He concluded with an offer by Brazil to further assist the FCT task and other NDs.

### **Guyana**

Jadgesh Singh (GFC) described the work in Guyana to consolidate archived and existing EO data, build local capacity, develop a benchmark map for 2009, map deforestation starting in 1990 using historical data from the archive, and conduct accuracy assessments. He also reviewed efforts to develop a national forest carbon stock assessment with activities including: developing a framework for forest carbon sample design (submitted, under review by GFC); measuring change in forest carbon biomass (a series of plots established across forest types); developing forest allometric equation (measure level of carbon storage across forest types); and developing conversion and expansion factors. Activities are supported by Winrock.

Key FCT related drivers include requirement for annual forest reporting and associated need for annual coverage of medium resolution satellite data (high-res coverage anticipated in the longer-term). This need can be met with the GEO FCT data coverage. Mapping forest degradation is also required. high-resolution observations are needed for hot spot areas. GEO FCT coverage of verification sites will be important. There is also a need for in-country capacity building to perform remote sensing data processing, interpretation and monitoring. In particular, skills are needed to work with a series of remote sensing data in synergy (i.e. Radar, optical, LIDAR etc.), which is needed to address the issue of cloud cover and creation of consistent time series.

Key short term actions include: holding a national FCT-related workshop including capacity building (lead: GFC and Wageningen University), arranging for access to the GEO FCT data acquired in 2009 and 2010, and commence R&D activities including accuracy assessment procedures. Longer term actions include establishing continuous and consistent remote sensing data coverage for Guyana and the in-country capacity to process and analyze remote sensing data for annual reporting.

### **Cameroon**

Haman Unusa (MEPN) identified the key issue of formalizing Cameroon as a ND. An official letter should be sent to invite Cameroon to participate as a ND in the GEO-FCT task and to clarify the benefits to and obligations of the country. MINEP will respond to the letter and specify national requirements and domains of cooperation. He also described the activities that Cameroon is organizing to prepare for REDD including: a workshop to launch R-PP elaborations and related National Strategy (end of Feb 2011); REDD+ partnership in place with Japan (10 Million US\$); a GEF-COMIFAC funded project on allometric equations for tree species and carbon stocks; a CBFF, MINEP submitted proposal; and a FAO-INPE proposal. He identified several capacity building needs, including training on in-situ data collection, satellite image analysis for deforestation and degradation; and software/hardware requirements.

### **Democratic Republic of Congo**

Christophe Musampa (DIAF/MENCT) reported that DRC has already defined the approach and plans to develop its MRV, based on FAO recommendation. DRC is waiting confirmation from the Congo Basin Forest Fund (CBFF) on the availability of funds to start activities. He commented that the MRV development plans would best be complemented with the additional, synergic elements and activities of the FCT objectives. It has been agreed to consolidate and activate the FCT related planning through a dedicated series of meetings in DRC, to be held around mid May 2011.

Key MRV needs include additional satellite datasets, with specific reference to radar data as a complement to the current approach based on Landsat. All related steps to ensure actual use are to be addressed:

The 2011-2012 planned activities include consolidating data acquisition, already performed for 2010. This includes ALOS Palsar data, present in the archives for verification sites to be progressively scaled up to “wall to wall” data. Support is needed for data and intermediate product processing to be ready for thematic analysis, with an associated capacity building program, focused on radar processing. RESTEC may be able to provide data, support and training for ALOS Palsar in the frame of Japan’s contribution to the REDD+ Partnership.

Regarding ground measurements, DRC has plans to start a ground measurement campaign in May 2011, provided CBFF funding is made available. Measurements at FCT related VS-Verification Sites are part of the campaign and, in principle, will be assigned highest priority to support finalization and validation of FCT products. If plans remain on track, in situ data at the Verification Sites may become available in the second half of 2011.

For data integration and carbon assessment, it has been agreed to review current plans (of substantially relying on carbon assessment from NFI ground data) in order to introduce new elements to address the broader FCT approach.

### **Tanzania**

Jared Otieno (MFRT-FBD) described the Tanzania national forest management (NAFORMA) and carbon monitoring programs. Priority issues for Tanzania are to facilitate the MRV systems working on the ground (NAFORMA), taking the first steps to operationalize the multi-source national forest inventory, facilitate forest resource mapping

and documentation of trends in the country, and facilitate effective and coordinated implementation of REDD related policies through the establishment of a National Carbon Monitoring Centre (NCMC).

The NAFORMA in-situ forest inventory data collection aims to generate information for national and international forest carbon MRV reporting requirements. He views the GEO-FCT as fitting into the National REDD Framework, which was developed to guide the National REDD Strategy process.

In its implementation of mapping forest resources and trees outside forest reserves, NAFORMA faces remote sensing data gaps, which limit the production of national Land use /Land cover maps. It is expected that the GEO-FCT can provide access to pre-processed remote sensing data required to fulfill this gap of required imageries. This will also facilitate national mapping of the land use changes and assessing forest degradation.

Preliminary milestones and associated products/deliverables for 2011 include: filling in identified gaps in current optical remote sensing data and finalize the production of LULC maps; and testing various pre-processed remote sensing data in the multi-source NAFORMA.

Similar to the situation with Cameroon, the status of Tanzania as a ND in GEO FCT requires discussion and formal invitation.

### **Indonesia**

Orbita Roswintarti (LAPAN) presented the plans for ND activities in Kalimantan (Borneo) and Sumatra. Current satellite observations include optical data from Landsat (1999-2010) from the Australia INCAS project, and radar data (JERS, ERS-1, ERS-2 - 1992-2006; ALOS PALSAR - 2006-now) from the LAPAN/Wageningen Univ./SarVision project and from JAXA.

Regarding in-situ observations, Verification Sites are located in Kalimantan (5 VS) and Sumatera (3 VS). As well, National Forest Inventory (NFI) data from the Ministry of Forestry is viewed as important and discussions are underway on data availability and sharing between ministers.

Data processing to date includes production of multi-temporal optical-based land cover images, and production of multi-temporal radar-based land cover images. Research is ongoing on the integration/interoperability of optical and radar images to produce cloud-free images. Issues being addressed include registration accuracy, DEM (radar data for mountainous areas), and agreeing on a common forest definition.

Plans for 2011-2012 include a kick-off coordination meeting (Indonesia, Netherlands, Australia, Japan) in mid March 2011, which will address detailed roles and responsibilities, coordination with other ongoing activities within GEO FCT and with INCAS work plans, the exchange of ground data for system validation, etc. Regarding data provision, in 2011 JAXA will provide ALOS PALSAR for VS in Kalimantan and Sumatera (300km x 300km mosaic data, 2007-2009, 1.1 products for all VS). Plans for capacity building include training on radar satellite image processing for LAPAN and related agencies from mid to end of 2011, conducted by Wageningen Univ./SarVision. By mid 2012 it is expected that production will be completed for the radar-based forest and land cover maps covering Kalimantan and Sumatra for the period 2007-2011.

The Indonesia ND team requests from GEO FCT assistance to acquire:

- DEM 30m for Kalimantan and Sumatera;
- high resolution optical data for VS (for classification, degradation); and
- methods of interoperability of optical/PALSAR, satellite-based products/in-situ observations.

## Tasmania

Tony Milne (CRC-IS) presented the Australian National Carbon Accounting System, which is a combination of remote sensing, climatic variables and forest growth models. He explained that the purpose of the Tasmania ND in the GEO FCT task is to address the scientific and technical issues associated with developing forest carbon data, maps and models. Issues include:

- Interoperability between satellite instruments to form time-series consistent change
- Integration of ground inventory and remote sensing
- Methods of accuracy assessment
- Building national capacity to assist other countries

Ongoing activities include developing: robust methodology for generation of wall-to-wall, time-series SAR mosaics; consistent approach to generation of forest information products using L-band SAR data alone, and through integration of C-, X- and L-band data; and interoperability with optical time-series (e.g., Landsat) and historic JERS-1 data.

Priorities in 2001-2012 are to address interoperability, the integration and merging of data sets to produce standardized products independent of data source. Planned activities include:

- Field work at calibration sites continuing
- SAR based mapping (refine land use type classification; investigate integration of C-, X- and L-band for forest type and degradation mapping)
- Validation of forest information products
- SAR-optical interoperability (demonstrate temporal integration using Conditional Probability Networks (CPN))
- Technology transfer and operationalisation (technical documentation and training).

## Nepal

Pem Kandel (MFSC) provided an overview of the Forest Resource Assessment process in Nepal, using the national forest inventory (NFI). Nepal is engaging in REDD readiness activities, including development of a forest carbon monitoring system. The presenter identified 7 potential VS across Nepal, which are permanent sample plots in the NFI.

Nepal is a GEO member and observer of the UN-REDD Programme. The REDD readiness process is on-going with the World Bank FCPF, with the REDD RPP already endorsed. As a result, the plans are very well suited to support FCT activities. Nepal, does require support to access different remote sensing data, such as TerraSAR, Envisat, ALOS, RADARSAT, VHR, and associated product development capacity. Thus, Nepal would like to be considered as a future candidate as a ND country in the GEO FCT.

## Conclusion

Giovanni Rum concluded the session and observed that the action plans illustrate that each of the NDs has unique national circumstances and different needs from the FCT task. The role of the NDs in the new Global Forest Observation Initiative (GFOI) will require discussion.

## 5. Action items

Table 1 summarizes the status, plans and actions for the FCT co-leads and NDs as detailed in the presentations and in section 4. Immediate actions focus on administrative issues related to ND formalization and team identification.

Prepared by Michael Brady (mbrady@nrca.gc.ca)



Table 1. National demonstrator status, plans and actions (in bold).

ND	Status, plans and actions					
	<u>Administrative efforts</u>		<u>RS data and products</u>		<u>Verification sites</u>	
	Nat. task coordination	Intl. collaboration	Generated to date	Planned 2011/12	Selection	Data compilation
Mexico	ND team established	Links established with CFS, CSA, FSU, Google, USGS, CarboNA	Vegetation Continuous Field; Forest / Non Forest Map; Growing Stock Volume; Biomass	Time series from 1990 to 2011; Testing of carbon budget models (CBM) in research sites; national C pools	9 sites selected with summary of data collections <b>7 sites identified in 2010 FCT VS table</b>	Products over the verification sites: land use 30 m cover maps; Satellite and ground data fusion (carbon density), decay and assimilation rates being measured
Brazil	ND team established	Wood Hole Research Centre	PRODES products, plus demo horizon 1 products generated for Xingu site: Forest/non-forest; Change; In situ-validation data 600+ points; Validation collection of new points	PRODES products, plus rigorous validation of Xingu products; integration of 2009/2010 Envisat time series in; X-Band fusion; test horizon 1c and 2 products (landcover, degradation); test Landsat data for interoperability with ALOS and Envisat; emission modeling from change data	Special methodology study site at Xingu (Kellendorfer) <b>6 sites identified in 2010 FCT VS table</b>	
Guyana	Officer of Guyana Forestry Commission	Winrock, Norway, Wageningen University, USFS, ESRI, WB FCPF	Benchmark forest map for 2009, the forest area change maps for 4 time periods, 1990-2010	Acquire GEO FCT data for 2009 and 2010, commence accuracy assessment	1 site, adjacent to REDD priority locations <b>2 sites identified in 2010 FCT VS table</b>	Mostly methods development for forest carbon stock assessment (root to shoot ratio equations, link to NFI measures) and integrating in situ data with GIS/RS

Table 1. cont...

ND	Status, plans and actions					
	<u>Administrative efforts</u>		<u>RS data and products</u>		<u>Verification sites</u>	
	Nat. task coordination	Intl. collaboration	Generated to date	Planned 2011/12	Selection	Data compilation
Cameroon	<b>Official invitation letter should be sent</b>	World Bank FCPF & GEF, GTZ, GAF, COMIFAC; CBFF, IUCN, WWF, CIFOR, ICRAF, IITO, WCS			4 sites identified in FCT VS table	Allometric equations for the Congo basin countries under discussion
Tanzania	<b>Need to be identified.</b> As well, NAFORMA has capacity to process field and RS data and produce map products, and can work with GEO-FCT Product Development team, once identified.	Finland, FAO, others?	NAFORMA Multi-source inventory results refer to RS and LULC maps.		None identified, but NAFORMA national forest inventory includes 856 Permanent Sample Sites available for use 4 sites identified in 2010 FCT VS table	
Indonesia	LAPAN involved in both Borneo (Kalimantan) and Sumatra ND activities. Role of other agencies in ND not clear.	Several agencies from Australia and Japan, Wageningen Univ., SarVision. Kick-off coordination meeting (Indonesia, Netherlands, Australia, Japan): Mid March 2011 Wageningen Univ. will conduct training on radar satellite image processing at Mid to end of 2011	Satellite observations: Optical data: Landsat (1999-2010) from INCAS project Radar data: JERS, ERS-1, ERS-2 (1992-2006); ALOS PALSAR (2006-now) from LAPAN /Wageningen Univ. /SarVision project and JAXA	In 2011: JAXA will provide ALOS PALSAR for VSs in Kalimantan and Sumatra (300km x 300km mosaic data, 2007-2009, 1.1 product for all VSs) Mid 2012: The production of radar-based forest and land cover maps covering entire Kalimantan and Sumatra for the period 2007-2011	Borneo: 5 VSs Sumatera: 3 VSs National Forest Inventory (NFI) from MoF, but data availability and sharing to be arranged. 4 sites in Borneo identified in 2010 FCT VS table	



Table 1. cont....

ND	Status and actions					
	<u>Administrative efforts</u>		<u>RS data and products</u>		<u>Verification sites</u>	
	Nat. task coordination	Intl. collaboration	Generated to date	Planned 2011/12	Selection	Data compilation
Tasmania	ND team established	CRC-SI, CSIRO, UNSW, DCCEE, Geoscience Australia, Forestry Tasmania	Wall-to-wall mosaics of Tasmania from ALOS PALSAR FBD 2007, PALSAR derived forest/non-forest maps (Horizon 1a), PALSAR derived land use type maps (Hor. 1b), C-band RADARSAT, ASAR,	Field work at calibration sites continuing; SAR based mapping; validation of forest information products; SAR-optical interoperability; Technology transfer and operationalisation	Calibration sites (50x50 km) include Mathinna, Takone, and Warra <b>3 sites identified in 2010 FCT VS table</b>	Validation activities using data from: DPIPWE TASVEG, FTAS expert field mapping, permanent inventory plots; Aerial photography, and Scattered IKONOS chips
D.R. Congo (new)	<b>Clarify ND team;</b> Representative is from National Forest Inventory and Management Division & National REDD Committee. FCT related planning in DRC to be held in May 2011	US CARPE, OSFAC, GOF-C-GOLD, JRC, UCL, FORAF-OFAC, WHRC, ITTO, Japan, WWF, WB-FCPF	Forest cover change from 1990-2000-2005 mapped using sampling (JRC) and wall to wall (UMD-SDSU) approaches using MODIS and Landsat. A map of forest biomass of DRC is underway using 2007 (WHRC).	Consolidate 2010 data acquisition for verification sites. Data and intermediate product processing start in 2011. Ground measurement campaign in May 2011, including FCT related Verification Sites. Activities dependant on CBFF funding.	Referenced, but no numbers and locations in presentation	
Colombia (new)	<b>Consolidate agency participation</b>	Wood Hole Research Centre, Moore Foundation	forest cover change, 1990, 2000, 2005	SAR data processing and training	4 sites	1 site prioritized for current in situ data collection
Nepal (proposed)	National level FRA team established <b>Nepal to be considered as a ND</b>	Finland (supporting NFI)			7 potential VS across Nepal, are permanent sample plots in the NFI	