Action Plan for Mongolia's National Forest Monitoring System for REDD+

Report of the Consultation Workshop

19-20 November 2013
Ulaanbaatar Hotel
Ulaanbaatar

Action Plan for Mongolia's National Forest Monitoring System for REDD+:

Report of the Consultation Workshop

19-20th November 2013
Ulaanbaatar Hotel, Ulaanbaatar

Executive Summary

Mongolia became a partner country of the United Nations collaborative initiative on Reducing Emissions from Deforestation and forest Degradation in developing countries (UN-REDD Programme) in June 2011 and has quickly taken steps to start implementing REDD+ readiness activities. Through the UN-REDD Programme, Mongolia has received technical capacity building support from UNDP and FAO.

FAO/UN-REDD's support has focused on the development of Mongolia's national forest monitoring system, which will allow the country to monitor forests and measure greenhouse gas (GHG) emissions and removals related to forestry and is a key component of any country's REDD+ infrastructure under the UNFCCC. In order to transparently plan and organize for the implementation of their national forest monitoring system, the Government of Mongolia is developing an Action Plan document that will set out the context, activities, arrangements, work plan and budget for its implementation. In recognition of the need for a wide consultative process in the development of such an Action Plan, the Government of Mongolia, with the support of FAO/UN-REDD, convened a consultation workshop on Mongolia's Action Plan for their National Forest Monitoring System for REDD+.

This document is the report of the consultation workshop on Mongolia's National Forest Monitoring System Action Plan, which took place on 19-20th November 2013 in Ulaanbaatar. Day 1 presented the international background and requirements for a national forest monitoring system for REDD+ under the UNFCCC, as well as the results of Mongolia's efforts to date to build capacity to implement REDD+, including national and subnational awareness raising and an economic study of the forest sector.

Presentations in the morning of Day 2 moved into the current status and capacities of the individual components of Mongolia's national forest monitoring system: remote sensing and GIS for forest monitoring (for the satellite land monitoring system), the national forest inventory and the national greenhouse gas (GHG) inventory. Based on the background provided in Day 1 and the status of existing systems in Mongolia presented in Day 2, break out groups discussed and presented the activities that should be included in the Action Plan document.

The material presented in Day 2 and the recommendations from the discussion groups will form the basis of a second draft of Mongolia's National Forest Monitoring System Action Plan, which will be distributed to relevant stakeholders in the first quarter of 2014.

Introduction

The Conference of the Parties (COP) of the UNFCCC has adopted a forestry climate change mitigation mechanism defined as '*Policy approaches and positive incentives on issues relating to reducing emissions from deforestation and forest degradation in developing countries, and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries*', known as "REDD+". REDD+ will provide positive incentives to developing countries to voluntarily reduce their rates of deforestation and forest degradation, and to increase their forest carbon stocks, as part of an anticipated post-2020 global climate change agreement.

The Government of Mongolia has recently committed to a green development path, notably through the creation of the Ministry of Environment and Green Development and the preparation of the Green Development Concept and Mid-Term Programme. REDD+ has the potential to contribute to green development by protecting global environmental resources (forest carbon stocks, but also biodiversity), helping to reverse land degradation, improving livelihoods of the rural poor and aiding adaptation to climate change.

Mongolia became a partner country of the United Nations collaborative initiative on Reducing Emissions from Deforestation and forest Degradation in developing countries (UN-REDD Programme) in June 2011 and has quickly taken steps to start implementing REDD+ readiness activities. Mongolia is the first country with significant boreal forest cover to join the programme and is deemed to have significant potential to reduce its forest carbon emissions, and enhance and sustainably manage its forest carbon stocks, by implementing REDD+ activities.

Since joining the UN-REDD Programme, Mongolia has received technical capacity building support from UNDP and FAO. FAO/UN-REDD's support has focused on the development of Mongolia's National Forest Monitoring System, which will allow the country to monitor forests and measure greenhouse gas (GHG) emissions and removals related to forestry and is a key component of any country's REDD+ infrastructure under the UNFCCC[1].

Nevertheless, the complexity of the technical components of a national forest monitoring system, in addition to the diverse number of actors (domestic and international) supporting the development of directly and indirectly relevant systems, present a barrier to a consolidated approach to the development and implementation of Mongolia's national forest monitoring system. To address this challenge, the Government of Mongolia decided to develop an Action Plan document for their national forest monitoring system, with the aim of bringing together all knowledge, capacities and on-going and planned activities into one consolidated plan.

In recognition of the need for a wide consultative process in the development of such an Action Plan, the Government of Mongolia, with the support of FAO/UN-REDD, convened a consultation workshop on Mongolia's Action Plan for their National Forest Monitoring System for REDD+.

---

[1] Following the guidance of Decision 1/CP.16, developing countries aiming to implement REDD+ activities are requested to develop a 'robust and transparent national forest monitoring system'.

Consultation Workshop

Day 1: International Context of REDD+ National Forest Monitoring Systems

Opening: Mr. J. Batbold, State Secretary

The workshop was officially opened by Mr. J. Batbold, State Secretary of the Ministry of Environment and Green Development. Mr. Batbold highlighted the importance of developing a robust and transparent national forest monitoring system for Mongolia to be eligible to implement REDD+ activities in the context of the UNFCCC. He stated that the system will be the tool by which Mongolia will measure, report and verify its performance in mitigating climate change through REDD+ activities.

The international context of REDD+: Mr. J. Scriven, FAO/UN-REDD

The information sessions of the first day began with an overview of the international context of REDD+. This narrative began with the formation of the Intergovernmental Panel on Climate Change (IPCC) in 1988, through the United Nations' (UN) Rio Earth Summit in 1992 and creation of the UNFCCC, and included an overview of the major milestones in international climate change policy to date. The evolution of REDD+ under the UNFCCC was then presented, from the introduction of an early format as an agenda item by the Coalition of Rainforest Nations (CRfN) in 2005, to the major decision adopted in Cancun in 2010 and the more recent agreed guidance from Durban (2011) and Qatar (2012). The presentation concluded with some brief points on the major challenges facing countries in the implementation of REDD+ activities as they work through the three phases of implementation.

Questions and discussion following this presentation addressed the efficacy of the Clean Development Mechanism (CDM) under the Kyoto Protocol – with particular reference to CDM forestry projects – and clarification of the links between national forest inventories (NFIs) and REDD+ implementation.

Current status of REDD+ in Mongolia: Ms. B. Enkhtsetseg, FAO-UNDP/UN-REDD

The second presentation of the day outlined the status of REDD+ readiness in Mongolia and the major actions taken to date. These include Mongolia becoming a partner country of the UN-REDD Programme, provincial consultations and awareness raising events in 2011 and 2012 and the development of a National REDD+ Readiness Roadmap, supported by the UN-REDD Programme, which is currently nearing completion. Ms. Enkhtsetseg also provided an overview of a recently concluded forest valuation study, carried out by UNDP/UN-REDD, which assessed the contribution of the forest sector to the national economy.

In the subsequent discussion, participants highlighted the need for a consolidated data-driven approach to the implementation of sustainable forest management (SFM), given that diverse government and non-government stakeholders were currently collecting and processing large amounts of forest-related data. This data will be important for policy making and should therefore be made available to all relevant stakeholders.

REDD+ social and environmental safeguards – learning from international best practice: Mr. I. Dorj, MEGD

The third presentation set out lessons learned on international best practice in the development and implementation of the seven REDD+ safeguards set out in the Cancun Decision[2], including through participation in a UNEP/UN-REDD workshop on REDD+ safeguards in March 2013. The Democratic Republic of Congo was identified as a stand-out performer to date, having set out its safeguards priorities and activities and designed its safeguards information system. Mr. Dorj identified the objectives of the REDD+ safeguards to include, among others, the mitigation of risks through the implementation of REDD+ activities, the enhancement of the climate change mitigation efficiency of activities and the promotion of co-benefits such as biodiversity conservation. To observe and implement the safeguards, a number of actions will need to be taken by the Government of Mongolia, including broad stakeholder engagement, integration of REDD+ activities into green development strategies, creation of an information system and – importantly – precise definition of goals of the safeguards and the information system.

Following the presentation, participants requested further information about the status of implementation of REDD+ safeguards in Mongolia, and asked whether there was best international practice/experience available on engaging local communities and the private sector in REDD+ implementation. Mr. Dorj responded that safeguards implementation was in its infancy in Mongolia and that more awareness raising was required. Mr. Scriven responded that a good example of community involvement in REDD+ implementation was evident in Ecuador, where the government have implemented the national 'SocioBosque' scheme to directly incentivize smallholders to implement forest conservation and sustainable forest management practices.

Forest user groups' input to REDD+: Mr. S. Tuguldur, MEGD

In the final presentation of the morning, Mr. S. Tuguldur reviewed local-level capacity for REDD+ implementation. He explained that levels of awareness of REDD+ at the local level are currently limited; and contrasted this to the global importance of the sustainable management of Mongolia's forest resources. Forest user groups (local-level community forest management groups) manage between them approximately 1.8m hectares and therefore have a key role to play in implementing REDD+. Considerable effort is required to raise their awareness, including enhancing cooperation among different REDD+ stakeholders to reach out to all relevant local-level actors.

National forest monitoring systems for REDD+: Mr. J. Scriven, FAO/UN-REDD

---

[2](a) Consistency with the objectives of international conventions and agreements; (b) Transparent and effective forest governance structures; (c) Respect for the knowledge and rights of indigenous peoples and local communities; (d) Full and effective participation of relevant stakeholders; (e) Consistency with the conservation of natural forests and biological diversity; (f) Actions to address the risks of reversals; (g) Actions to reduce displacement of emissions.

The afternoon of day 1 was dedicated to reviewing the international guidance on the roles, functions and components of a national forest monitoring system for REDD+. This began with an outline of the decisions on national forest monitoring systems adopted to date by the UNFCCC COP – the most significant being Decision 4/CP.15 (adopted in Copenhagen, 2009) and Decision 1/CP.16 (adopted in Cancun, 2010). Together, these decisions inform countries aiming to implement REDD+ activities that the national forest monitoring system has two functions: monitoring and MRV – as set out in Figure 1.
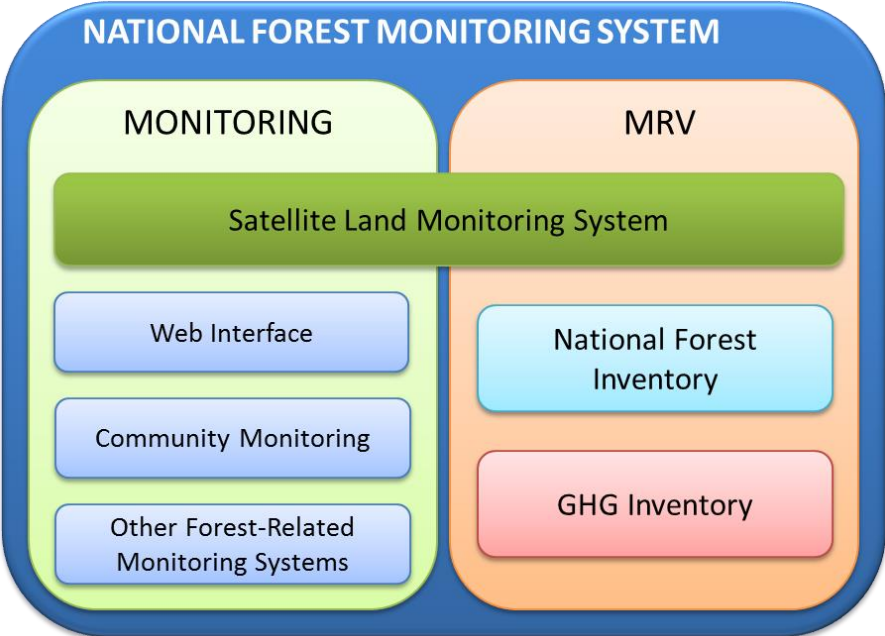
NATIONAL FOREST MONITORING SYSTEM

MONITORING

Satellite Land Monitoring System

Web Interface

Community Monitoring

Other Forest-Related Monitoring Systems

MRV

National Forest Inventory

GHG Inventory

Figure 1: The functions and components of a national forest monitoring system for REDD+.

In brief terms, the monitoring function was explained as being required to assess whether REDD+ activities are resulting in positive outcomes (i.e. whether they are working effectively or not). The tools for forest monitoring for REDD+ were reviewed as follows:

- Satellite remote sensing: Cost-effective method monitor large areas;
- Web-GIS portal: To share data transparently;
- Community monitoring: Bottom-up validation of satellite data, incorporation of local knowledge into national monitoring;
- Other forest monitoring systems: Build on existing systems (e.g. systems to monitoring logging concessions or protected areas).

Particular reference was made to the Brazilian Government's forest monitoring system, the open-source software they use and the web-GIS portal they use to share their data and results transparently with any interested user.

The MRV function of the national forest monitoring system is required to assess the climate change mitigation performance of REDD+ activities. This is achieved by estimating GHG emissions and removals related to forestry, reporting these estimates to the UNFCCC Secretariat as part of the national GHG inventory, and subsequently having national data and methods undergo a process of verification coordinated by the UNFCCC Secretariat. The Measurement component of MRV is the most cost- and effort-intensive, involving (following

the guidance of the IPCC) national assessments of land use and land use change (to assess 'Activity Data') and collection of data on forest carbon stocks and stock changes (to assess 'Emission Factors'). These data are compiled to produce the national GHG inventory for the land use, land use change and forestry (LULUCF) sector, as per Figure 2. Nevertheless, these data-intensive systems only need to be fully operational in Phase 3 of REDD+ implementation, which will allow for a gradual phased implementation, based on existing systems and capacities in Mongolia.
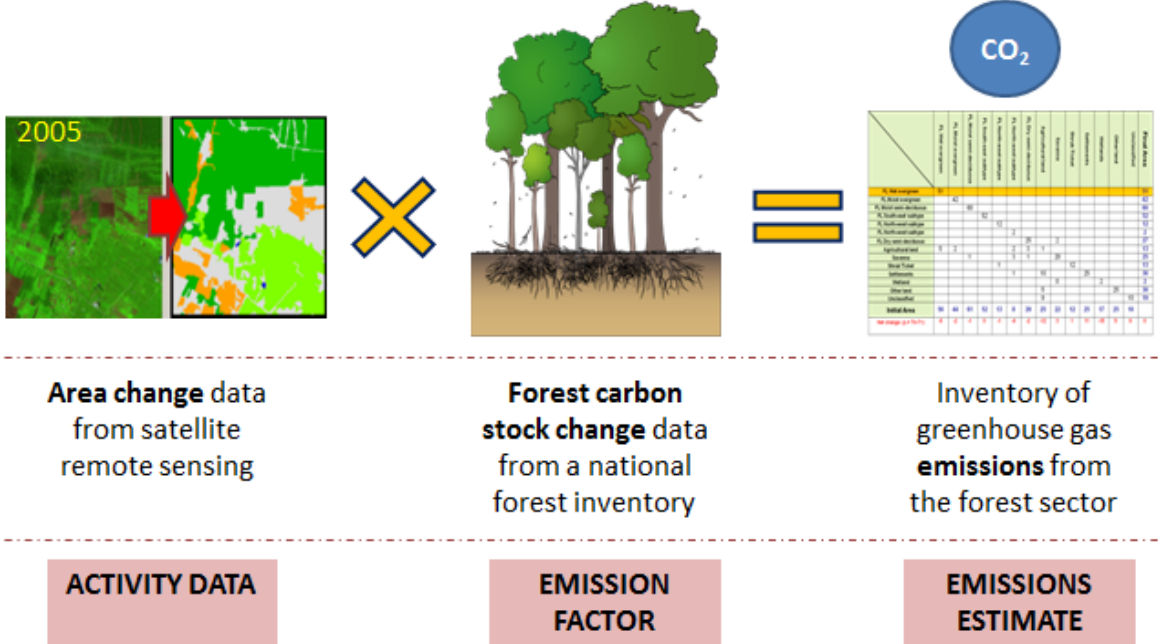

Figure 2: IPCC equation for estimating GHG emissions and removals from the LULUCF sector.

As part of the review of the MRV functions, an overview of IPCC methods for assessing activity data and emission factors was provided; followed by examples of GHG inventory tables for reporting to the UNFCCC. This was followed by a presentation on reporting and verification for REDD+, which set out the enhanced reporting requirements for developing countries aiming to implement REDD+ activities: national communications will need to be submitted every four years, which will be supplemented by biennial update reports (to be reported every two years), which will need to include a national GHG inventory.

Introduction to Mongolia's national forest monitoring system Action Plan: Mr. J. Scriven, FAO/UN-REDD

The final presentation of the first day provided an overview of the first draft of Mongolia's national forest monitoring system Action Plan, which was compiled in 2012. To begin with, the following objectives of the Action Plan were set out:

- To set out all the details, tasks and responsibilities required to develop Mongolia's National Forest Monitoring System to ensure:
    - Transparency;
    - Accountability;
    - Consistency with international guidance;

- To clarify the institutional arrangements for the implementation of Mongolia's National Forest Monitoring System;
- To set out how Mongolia will follow a phased approach to implementation and technical capacity building, including specific activities;
- To collate all sources of financial and technical support into one document;
- To set out a budget and work plan for implementation of Mongolia's national forest monitoring system.

Examples of similar Action Plans from other countries including Indonesia, Bangladesh and Vietnam were briefly reviewed, before the contents of Mongolia's document were outlined. Draft institutional arrangements for the implementation of Mongolia's national forest monitoring system were presented, which were to serve as a basis for further discussion and definition on day 2. The immediate next steps for the development of the Action Plan were set out as follows:

- Break-out groups on day 2 will be given different topics, with lists of potential activities to provide the basis for discussion
    - Results of discussions will be presented to the plenary and provide the basis for whole-group discussion;
- Institutional arrangements and responsibilities are critical to clarify:
    - For the overall system;
    - For each component of the system;
- Need for agreement on details of the process to finalize and endorse the Action Plan.

This final presentation provided the background and context for day 2, where Mongolia-specific capacities would be presented and discussion would take place on the contents of the Action Plan.

Day 2: Developing Mongolia's National Forest Monitoring System

National capacities and activities on remote sensing and GIS for land use mapping in Mongolia: Ms. Z. Narangerel, Environmental Information Centre (EIC) and Mr. Batsaikhan/Battulga, Institute of Geo-Ecology

Ms. Z. Narangerel, representing the EIC, provided an overview of the current land use applications of remote sensing and GIS (RS/GIS) in Mongolia. Government agencies make use of RS/GIS technologies for diverse purposes, including pasture land monitoring and disaster risk reduction planning, with the EIC being a key national actor for RS/GIS. EIC uses Modis data for regular forest fire monitoring and snow cover mapping; and used it in an analysis of land use change between 1992 and 2002 which found that desert area had expanded. A local-level land use change analysis was carried out using high-resolution Alos data, covering 230,000ha; this analysis made use of cadastral data and updated it using RS/GIS. EIC hosts a GIS database built using open-source software (POSTGRIS, POSTGRES, MAPSERVER), and have a forest reserve database from which their forest fire data can be downloaded.

In 2013, EIC has received support from FAO/UN-REDD on activity data assessment using the software Collect Earth, part of FAO's open source family of software, Open Foris. Collect Earth makes use of data freely available through Google Earth (a software application) and Google Earth Engine (an online platform) to allow a complete and statistically robust national assessment of land use and land use change; this data can be used to report activity data in the national GHG inventory. Looking forward, Mongolia is in need of further technical capacity building and government personnel for RS/GIS-related work. For example, there are archives of old data that require digitization. The government should consider how best to establish a sustainable satellite land monitoring system that will serve the multitude of data needs for domestic policy making and international reporting.

Following this, Mr. Batsaikhan/Battulga presented a report entitled 'Remote sensing for forest cover monitoring and characterization', which aims to set out specific methodologies for forest monitoring. The report advocates for the use and combination of digital elevation models (DEMs), surface temperature maps, and Modis- and Landsat-derived data. The method was piloted at two sites, the Khangai Mountain Forest and Southern Baikal, with ground data collected on basal area, canopy cover, average stand height and forest types.

Discussion following the presentation covered many issues, including the national forest definition (the need for it to be based on parameters that can be easily and cost-effectively monitored/measured); the use of the ground temperature parameter (the use temperature can be a useful measure of the presence of forest but is still at an experimental stage); the exclusion of the basal area parameter (it is a useful measure for estimating timber stocks, e.g. for tax purposes, but difficult to measure (cannot be determined from RS/GIS analysis) so was not included in the forest definition for the NFI).

Preparatory studies for Mongolia's multipurpose national forest inventory:
- ***Mr. Ch. Dorjsuren, Institute of Botany, Mongolian Academy of Sciences***
- ***Dr. Ganbaatar and Dr. Bayartsetseg, University of Science and Technology (UST)***
- ***Prof. N. Baatarbileg and Dr. S. Gerelbaatar, National University of Mongolia (NUM)***

A series of presentations outlined studies that had been carried out (and/or are in progress) to prepare for the full national implementation of the NFI. Mr. Dorjsuren presented a tree biomass study that had been carried out over six aimags, in which a large number of trees of different sizes and species had been harvested and their biomass analyzed – both at wet and dry weight. The team followed the FAO methodology for estimating tree biomass, with the objective of collecting Mongolia-specific allometric equations which will provide critical data for the analysis of NFI data to determine forest carbon stocks and changes. The study will be followed by further field campaigns.

Subsequent questions and discussion covered the number of trees required to develop reliable data sets and equations (estimated at n=180; which cannot be done in one year and will require a number of field campaigns to complete; they are aiming to analyze 20 trees/species); and the use of the data and results (will be made publically available).

Dr. Bayartsetseg then presented on the research undertaken to determine the data collection field methodology for the multipurpose NFI, with the specific objectives of:

- Defining the shapes of inventory plots;
- Selecting measurement parameters;
- Developing alternatives for inventory data forms;
- Developing instructions for completing inventory data forms;
- Selecting sample plots;
- Defining steps for measurement;
- Developing guidelines of measurement.

After setting out the broad methodology, questions and discussion addressed: the human capacity needs for undertaking such a methodology (teams of 5-6 people took between 40 minutes and two hours to complete one plot, in this way three plots can be completed in one day); why the radius of the plot was reduced as a result of the research (in order to allow more plots to be completed in a day); the need for further development and consideration of the proposed methodology (confirmation was given that further discussions would be forthcoming in 2014); the lack of canopy cover measurement (excluded due to time considerations); the need to follow international best practice and IPCC guidance for the estimation of emission factors; the challenge of access to plots; the inclusion of permanent sample plots in the NFI system to allow re-measurement over time; the importance of considering human resources/capacities available, time-scale and the need to discuss the methodology with the private companies who will carry out the work.

To end the session, Dr. Gerelbaatar presented results of the National University of Mongolia's (NUM) forest carbon stock research, which employed the plot shape set out in Figure 3.

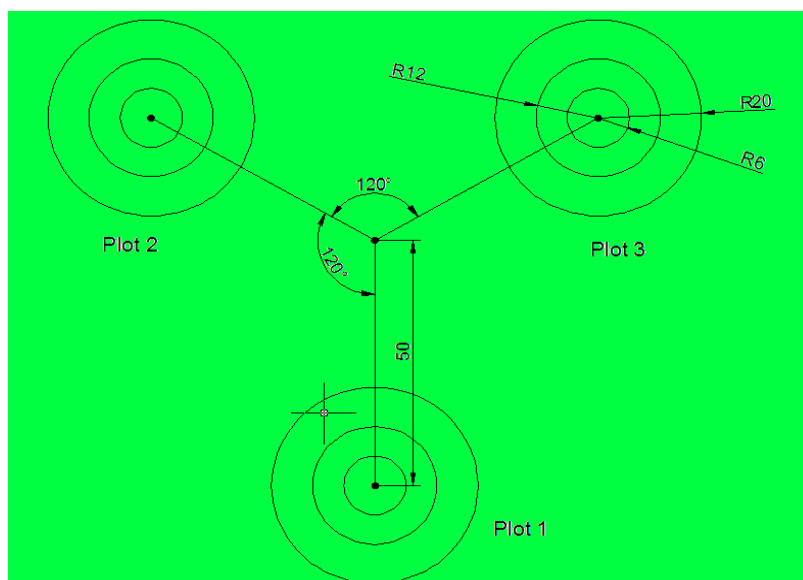**Figure 3. Sampling design for NUM's research on forest carbon stocks.**

This research collected data on four carbon pools considered by the IPCC: aboveground, dead wood (standing and down), litter and soil (i.e. not considering belowground biomass), and made estimates of total carbon stocks for 12 forest types. The estimates ranged from 46.38 tC/ha (at site Bu.Khya 39) to 283.46tC/ha (at site Bu.Khu 20).

Multipurpose Inventory as part of the National MRV for Greenhouse Gas Reporting: Assessment of Activity Data: Mr. Ludger Sonntag, GIZ and Mr. B. Otgonsuren, MEGD

Mr. Sonntag provided an overview of the Landsat programme and the work supported by GIZ on the development of a forest mask for Mongolia. On Landsat, he explained the history of the programme, including the introduction of the Thematic Mapper (TM) to Landsat 5 which facilitated land cover classification at 30m resolution, the introduction of the enhanced thematic mapper plus (ETM+) sensor on Landsat 7, and the problems developed by Landsat 7 in 2003 relating to the scan lines. An overview of the newly-launched Landsat 8 was then provided, setting out the following technical specifications:

- Two new spectral bands;
- A deep-blue band for coastal water (band 1);
- A band for cirrus cloud detection (band 9);
- Pixel size: 15 meters/30 meters/100 meters (panchromatic/multispectral/thermal);
- Captures approximately 400 scenes a day (Landsat 7: 250);
- Landsat 8 data are sufficiently consistent with data from the earlier Landsat missions;
- Main instrument: Operational Land Imager (OLI);
- Improved land surface information.

The two portals for downloading Landsat 8 data were also reviewed: Glovis (http://glovis.usgs.gov) and EarthExplorer (http://earthexplorer.usgs.gov), followed by detailed instructions for downloading and processing data through Glovis. Mr. Sonntag concluded that a forest mask (a forest/non-forest map) for Mongolia was currently being compiled and that the final product could be expected in December 2013.

Multipurpose Inventory as part of the National MRV for Greenhouse Gas Reporting: Assessment of Emission Factors: Mr. Ralf Ludwig, GIZ

Mr. Ralf Ludwig presented progress on the work to re-design Mongolia's NFI, which is receiving support from GIZ. He started by setting out the objectives of a multipurpose NFI that is suitable for REDD+ reporting:

- Inventory should exploit RS data as auxiliary to field data;
- Design should be pre-evaluated by experts, including forest statisticians, to assure that it is feasible and will yield credible results;
- Analysis should consider how to produce annual estimates of carbon stocks and stock changes, possibly as early as the first year following implementation;
- Inventory should be able to assess carbon stock changes from fellings;
- Inventory must be designed to achieve the desired allowable error estimates for the current state and change estimates, including change estimates for each carbon pool (aboveground biomass, belowground biomass, litter, soil, deadwood) at the national level;
- Analysis must permit statistically defensible assessment of uncertainty including all sources of variability;
- Inventory must permit assessment of quality assurance and control.

He also highlighted the need to implement the NFI in the context of a phased approach to REDD+ that allows Mongolia to build national capacities for NFI planning and implementation. He then set out the proposed sample plot design, as shown in Figure 4.
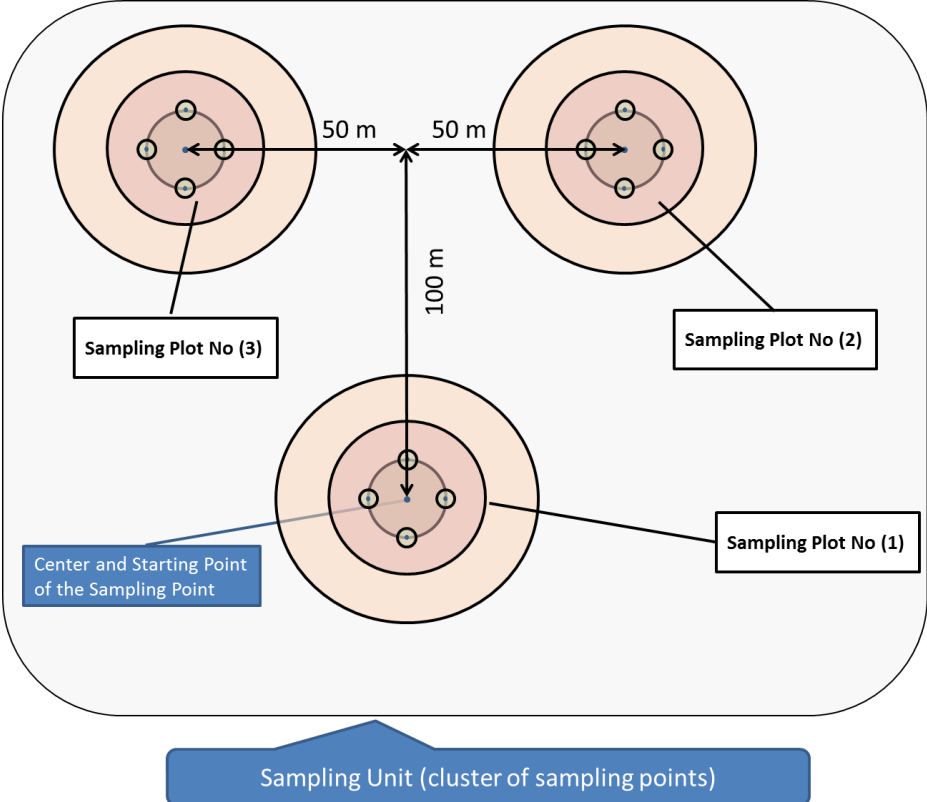

Figure 4. Proposed multipurpose NFI sample plot design.

The proposed data to be collected was then outlined, as follows:

- Tree data;
- Species;
- Diameter at breast height: all trees;
- Total height: for two trees per species per plot;
- Damage at the tree: in classes – crown damage, bark damage, insect damage;
- Health in classes to include standing dead, decay percentage for dead trees;
- Quality: in classes – to be developed and agreed;
- Regeneration damage; browsing animal damage.

He then outlined the major next steps involving further stakeholder consultations, finalization of the methodology and adoption by the government, and the training of field teams in 2014.

Subsequent questions and discussion addressed whether GIZ was also supporting Mongolia in procurement of all equipment necessary for the implementation of the NFI (yes) and the need to ensure the sustainability of the implementation of the NFI beyond the lifetime of

the GIZ support (it is hoped that in future all financial needs for the implementation of the new multipurpose NFI are incorporated into the national budget allocated to MEGD).

Mongolia's National Communication to the UNFCCC and GHG inventory: Ms. T. Batsuuri, Head of the CDM Unit, Climate Change Coordination Office (CCCO), MEGD

The final presentation before the break-out discussion groups was delivered by Ms. Batsuuri of the MEDG's CCCO, which began with an overview of Mongolia's reporting to the UNFCCC, encompassing the following documents:

- Initial National Communication (INC) (1st November 2001)
- Submission on NAMAs (28th January 2010)
  - (Which includes the implementation of improved forest management and REDD+)
- Second National Communication (SNC) (10th December 2010)
- National Action Program on Climate Change (6th January 2011)
- Technology Needs Assessment (2013)

It was highlighted that the implementation of the NAMAs identified in their submission will require international assistance, particularly for the implementation of an MRV system. It was also noted that the CCCO have hired a GHG inventory expert and have requested financial support from Japan and South Korea. Upcoming reporting activities were identified as:

- Preparation of the first Biennial Update Report (BUR);
- Preparation of the Third National Communication.

The second part of the presentation provided details of Mongolia's national GHG inventory (as of 2006, reported in their 2010 SNC). Major sources of emissions were identified as enteric fermentation (agriculture sector) and energy industries. The LULUCF sector was assessed as a net sink of GHGs in the country, though it was calculated using only default values and not accounting for disturbances. In the context of capacity building support for Mongolia's national GHG inventory, Ms. Batsuuri identified the issues set out in Table 1.

Table 1: Barriers and necessary support for preparing Mongolia's GHG Inventory.

	Barriers	Necessary support
Data collection	Some data needed for inventory calculation are not included in the statistical yearbook and there are uncertainties related as to where to obtain some of the data	Establishment of proper network to share information, data and include data necessary for inventory calculations into national statistical yearbooks
Emission factor	IPCC default values sometimes could result in over- or under-estimation of emissions due to not reflecting specific country circumstances such as the nomadic livestock sector	Country specific emission factors are necessary in some sectors such as LULUCF and agriculture

Expert judgment	Some of the data are found in aggregate level from statistical yearbooks which requires expert judgment to divide them into categories (such as dividing coal into subtypes); there is a shortage of capable experts to support this process	Capacity building for training sectoral experts is urgently needed

The presentation concluded with the need to 1) enhance national capacities to be able to produce national GHG inventories that are timely, consistent and comprehensive; 2) establish a formal network to share information on mitigation actions; and 3) build capacities to assess country-specific emission factors and activity data.

Discussion centred on the source of GHG emissions in Mongolia and the reasons behind emissions from agriculture being so high (being due to enhanced land cultivation and livestock management) and Mongolia's ranking among the world's countries in terms of emissions (Mongolia accounts for just 0.04% of global anthropogenic emissions so ranks very low among other countries as an emitter, although by other measures such as emissions intensity or emissions per GDP it ranks higher).

Discussion Groups: Feedback and input on sections of the NFMS Action Plan

Participants divided into thematic groups and were presented with lists of potential activities and sub-activities to consider for inclusion in the Action Plan. See Annex 3 for the lists of activities. The groups discussed the following topics:

1. Institutional arrangements for Mongolia's national forest monitoring system: linking existing institutions and data sources (facilitated by MEGD, FRDC and EIC);
2. Remote sensing and GIS for forest monitoring – activities, gaps and needs (facilitated by EIC and GIZ);
3. Mongolia's National Forest Inventory – activities, gaps and needs (facilitated by GIZ);
4. Mongolia's national GHG inventory and UNFCCC reporting – activities, gaps and needs (facilitated by MEGD and CCCO).

All groups were asked to discuss and record potential risks associated with the implementation of their particular area, and/or of the national forest monitoring system as a whole.

Presentations from Discussion Groups

Group 1: Institutional arrangements for Mongolia's national forest monitoring system

The rapporteur from Group 1 explained that they had broadly agreed to the institutional arrangements set out in the draft Action Plan, but had made some additions and modifications (set out in Figure 5), as follows:

- All data, prior to be submitted to international organizations, should pass through the National Statistics Agency, to ensure consistency in all figures that are reported internationally;
- A remote sensing laboratory will be established that will house staff from the EIC and FRDC;
- A national forest monitoring system Steering Committee will be established to provide guidance and oversight to the operation of the system;
- The domestic independent quality assurance process should be coordinated by the FRDC and will include participation from academic institutions and NGOs
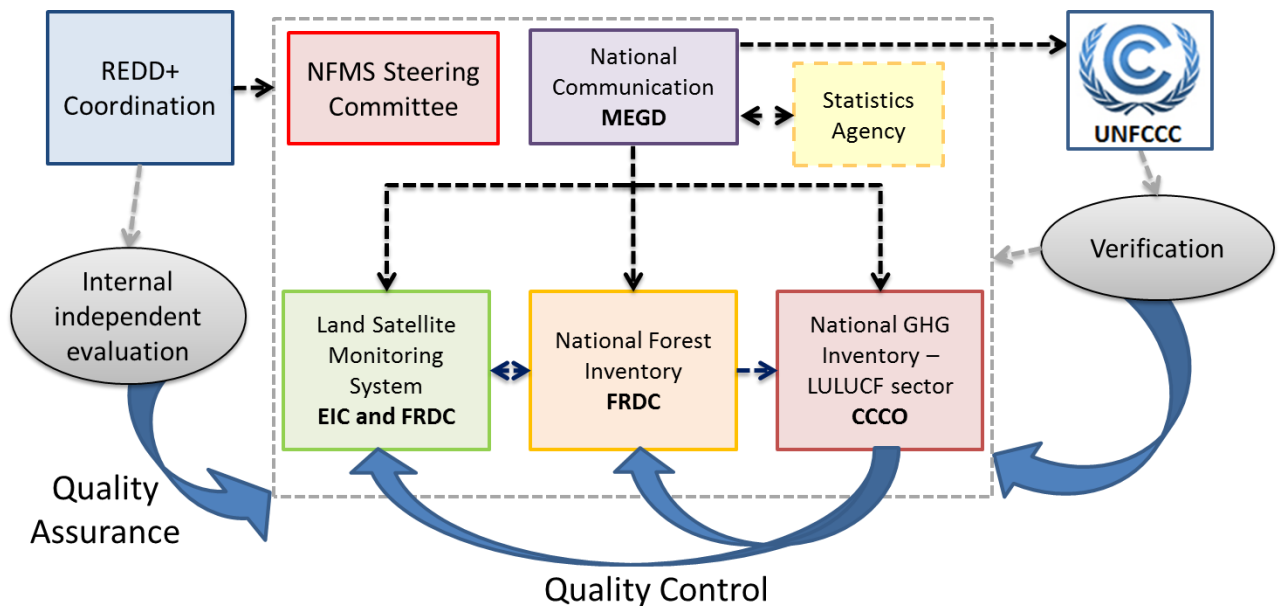

Figure 5: Institutional arrangements for Mongolia's national forest monitoring system.

Group 1 identified the following risks associated with implementation of the national forest monitoring system:

- Financial/economic risks: the systems requires a stable and predictable state budget;
- Political risks: a change of government could affect the implementation of activities and/or the operation of the system;
- Practical risks: the system requires equipment and technology to run, which will require technical skills and financial support to maintain;
- Human resources: to operate efficiently, the system will require more trained technical personnel than are currently in place;
- Communications risks: miscommunications/misunderstandings about the roles and responsibilities of the system could lead to conflicts between stakeholders (clear institutional arrangements and the existence of a Steering Committee will mitigate this risk).

Group 2: Development of Mongolia's Satellite Land Monitoring System

Group 2 was comprised of stakeholders from FRDC, the private sector and GIZ. The group rapporteur reported the following:

- The clarification of institutional arrangements for the satellite land monitoring system should remain as the first activity;
- For step 2 – the strengthening of stakeholders' technical capacities – financial resources first need to be secured;
- New staff are required in order to have a fully operational and regularly updated system; it needs to be clarified whether these will be full-time regular positions or consultants who will be recruited on a temporary or part-time basis;
- The reference map should be renamed as the 'basemap';
- The forest map of the country should be updated on an annual basis;
- It is unclear from the activities whether the geospatial database for the satellite land monitoring system will be an entirely new database or whether it can be built on the existing one in EIC;
- All major risks are already included; though a priority is the consideration of the predictability of financial support in order to ensure the sustainability of the system once it is operational.

Questions and discussion following Group 2's presentation centered on staffing needs, the types of contracts that would be issued, the need to establish a dedicated RS/GIS laboratory, and training needs.

Group 3: Development and implementation of Mongolia's multipurpose NFI

Group 3 was facilitated by GIZ (who have a large ongoing NFI support project) and attended by stakeholders from government and private sector inventory entities. The main points from the discussion were as follows:

- The first step – launching of the NFI – has already been completed;
- The piloting of the new methodology will be implemented in 2014, subject to final approval of the methodology by the Ministry and finalization of a forest definition for the purposes of REDD+ monitoring and measurement;
- Following agreement on the final methodology to be used, training of field teams will take place in 2014, potentially as early as March;
- A master plan / schedule for implementation of the entire NFI will need to be developed and approved by the Ministry;
- The fifth step – reporting to the UNFCCC – will be led by CCCO, though forestry officers will require further training on reporting needs and the format that data outputs from the NFI should take.

Risks identified by Group 3 included the following:

- Natural disasters occurring during the implementation of field data collection;
- Delays in implementation leading to failure to report to the UNFCCC in a timely manner;
- Financial risks: unpredictable funding for NFI implementation following the GIZ project;
- Equipment procurement delays;

- Lack of human resources to carry out the field data collection;
- Health problems and hazards involved in field data collection.

Group 4: Development and implementation of Mongolia's GHG inventory for the LULUCF sector

Group 4's discussion was facilitated by CCCO officers; with the main points of discussion as follows:

- On step 1 – the inception workshop of the GHG inventory and raising of stakeholder awareness – the group added the development of a recommendation for decision makers to ensure guaranteed financial and legal sustainability of the CCCO to carry out the GHG inventory, through the publishing of a legal act;
- A further amendment to step 1 was the inclusion of international support to determine the requirements, needs and functions of the GHG inventory laboratory; and to establish the lab on the basis of these recommendations;
- Activity 3 – the development of a staffing proposal for the lab – was deleted as this activity lies in the jurisdiction of the Law on Public Service and the Labor Law of Mongolia, so is out of the control of CCCO;
- Under Activity 4 – the training of staff – the group highlighted the need to train subnational Forest Unit staff in the generation and use of NFMS data;
- The Group also concluded that quality assurance and quality control processes should be coordinated by CCCO.

The risks identified by the group were:

- Delays in the field work schedule leading to reporting delays;
- Lack of transparency in terms of objectives and outcomes of the GHG inventory for the LULUCF sector leading to confusion among stakeholders and inefficiency in its development.

Outline of next steps: Mr. J. Scriven, FAO/UN-REDD

Following the presentations from the groups, a brief outline of the next steps was set out, namely drafting and distribution for comments of a report of the workshop, re-drafting of the Action Plan according to the activities discussed in the groups, distribution of the Action Plan for comments, and finalization of the Action Plan.

Workshop close: Mr. B. Otgonsuren, MEGD

The workshop was closed by Ministry representative Mr. B. Otgonsuren, Senior Specialist of the Division of Forest Conservation and Reforestation, MEGD.

Conclusion and Next Steps

The workshop was well attended by a broad range of stakeholders and much useful discussion took place on the specific activities to include in the national forest monitoring system action plan document, as well as on how to link the individual components together. An important outcome of the workshop was the discussion and agreement on the institutional arrangements for Mongolia's national forest monitoring system, which will underpin its transparent, accountable and effective management.

On the basis of the data and information gathered at the workshop, a new draft of the Action Plan will be produced to reflect:

- The most recent status of activities, programmes and projects related to the development and implementation of Mongolia's national forest monitoring system;
- The most recent status and outcomes of UNFCCC decisions (with new guidance on national forest monitoring systems having been published at COP 19 in Warsaw, November 2013);
- Discussed and agreed upon institutional arrangements;
- Discussed and agreed upon activities for the development and implementation of each of the components of the national forest monitoring system;
- An updated work plan and budget, taking into account ongoing activities, programmes and projects being implemented through national policy/agencies, NGOs and international organizations.

The next draft of the Action Plan will be distributed to stakeholders in the first quarter of 2014 and will be followed by a round of comments; subsequent to which the document will be finalised.

Annex 1: Workshop agenda

Day 1: International Context and Guidance

Time	Presentation Title / Activity	Presenter / Notes
8.30-9.00	Registration of participants	
9.00-9.15	Welcome address	Mr. J. Batbold, State Secretary, MEGD
9.15-9.30	Introduction to workshop	Ms. B. Enkhtsetseg, UN-REDD National Facilitator
9.30-10.30	The international context of REDD+	Mr. Joel Scriven, FAO/UN-REDD
10.30-10.40	Group photo	
10.40-11.00	Tea/coffee break	
11.00-12.00	Current status of REDD+ in Mongolia	Ms. B. Enkhtsetseg
	REDD+ Social & Environmental Safeguards mechanism and international experiences	Mr. I. Dorj, MEGD
	Forest user Groups input to REDD+ and International experiences on Free, Prior, and Informed Consent (FPIC)	Mr. S. Tuguldur, FRDC
12.00-12.30	Facilitated Q & A	Ms. B. Enkhtsetseg
12.30-13.30	Lunch	
13.30-14.00	National forest monitoring systems for REDD+: **Overview and monitoring of REDD+ activities**	Joel Scriven
14.00-14.45	Facilitated Q & A	Ms. B. Enkhtsetseg
14.45-15.15	National forest monitoring systems for REDD+: **Measurement** in the MRV System	Joel Scriven
15.15-15.30	Tea/coffee break	
15.30-16.00	National forest monitoring systems for REDD+: **Reporting and Verification** in the MRV System	Joel Scriven
16.00-16.30	Introduction to Mongolia's National Forest Monitoring System **Action Plan**	Joel Scriven
16.30-17.00	Facilitated Q & A / Discussion	Ms. B. Enkhtsetseg
18.00	Workshop dinner	

Day 2: National Forest Monitoring System: Arrangements and Implementation in Mongolia

Time	Presentation Title / Activity	Presenter / Notes
9.00-9.15	Presentation of the day's programme	Ms. B. Enkhtsetseg
9.15-9.30	Review of day 1	Mr. Joel Scriven
9.30-10.00	National capacities and activities on remote sensing and GIS for land use mapping in Mongolia	Mr. Kh. Michid, FRDC Ms. Z. Narangerel, EIC
10.00-10.30	Multipurpose Inventory as part of the National MRV for Greenhouse Gas Reporting: Preparatory Studies and their Results	Mr. Batsaikhan/Battulga, Institute of Geo-Ecology; Mr. Ch. Dorjsuren, Institute of Botany; Dr. Bayartsetseg, STU;

		Dr. Gerelbaatar, NUM
10:30-11:00	Multipurpose Inventory as part of the National MRV for Greenhouse Gas Reporting: Assessment of Activity Data	Mr. Ludger Sonntag, GIZ/ Mr. B. Otgonsuren, MEGD
11:00-11:15	Tea break	
11:15-11:45	Multipurpose Inventory as part of the National MRV for Greenhouse Gas Reporting: Assessment of Emission Factors	Mr. Ralf Ludwig, GIZ/DFS
11.45-12.15	Mongolia's National Communication to the UNFCCC and GHG inventory	Ms. Tsendsuren, Head of the CDM Unit, CCCO
12:15-13:00	Discussion groups: **Feedback and input on sections of the NFMS Action Plan** 1. Institutional arrangements for Mongolia's National Forest Monitoring System (linking existing institutions and data sources, facilitated by MEGD, FRDC and EIC) 2. Remote sensing and GIS for forest monitoring – activities, gaps and needs (to be facilitated by EIC and GIZ) 3. Mongolia's National Forest Inventory – activities, gaps and needs (to be facilitated by GIZ) 4. Mongolia's national GHG inventory and UNFCCC reporting – activities, gaps and needs (to be facilitated by MEGD and CCCO)	
13:00-14:00	Lunch	
14:00-15:00	Discussion groups (continued)	
15:00-15:45	Presentations from groups and Q & A	
15.45-16.00	Tea break	
16:00-16:30	National Forest Monitoring System Action Plan: Summary of recommendations and next steps	Joel Scriven, FAO/UN-REDD
16:30-16:45	Closing remarks	Mr. B. Otgonsuren, MEGD

Annex 2: List of participants

No.	Name of participants	Position & Organization	Remark
1	Mr. J.Batbold	State-Secretary, MEGD	
2	Ms. Bulgan	General-director of the Department of Green Development Policy & Planning, MEGD	
3	Mr. B. Gantulga	General-director of the Department of Policy Implementation, MEGD	
4	Mr. Ts. Banzragch	Director of the Forest Conservation and Reforestation Coordination Division	
6	Mr. D. Batbold	Director of the International Cooperation Division, MEGD	
7	Ms. Kh. Khishigjargal	Senior Specialist of the Department of Green Development Policy & Planning, MEGD	
8	Mr. I. Dorj	Specialist of the Department of Policy Implementation, MEGD	
9	Mr. Tumurbaatar	Specialist of the Department of Policy Implementation, MEGD	
10	Mr. B. Otgonsuren	Senior Specialist of the Forest Conservation and Reforestation Coordination Division, MEGD	
11	Mr. N. Enkhtaiban	Senior Specialist of the Forest Conservation and Reforestation Coordination Division, MEGD	
12	Mr. Sh. Erdenedavaa	Senior Specialist of the Forest Conservation and Reforestation Coordination Division, MEGD	
14	Ms. Ch. Mungunshagai	Specialist of the Forest Conservation and Reforestation Coordination Division, MEGD	
15	Mr. Ts. Chuluunbaatar	Specialist of the Forest Conservation and Reforestation Coordination Division, MEGD	
16	Mr. D. Jagdag	Specialist of the Forest Conservation and Reforestation Coordination Division, MEGD	
17	Ms. D. Enkhjargal	Specialist of the Forest Conservation at UB Hotel and Reforestation Coordination Division, MEGD	
18	Mr. Kh. Tuvshinbayar	Director of the Cadastre Division, MEGD	
19	Mr. E. Erdenekhuu	Specialist of the Cadastre Division, MEGD	
20	Mr. S. Gantulga	Director of the FRDC	
21	Mr. Ganbat	Head of the Unit, FRDC	
22	Mr. Kh.Michid	Head of the Unit, FRDC	
23	Mr. Ganzorig	Head of the Unit, FRDC	
24	Mr. Ch. Bat-Ulzii	Specialist, FRDC	
25	Mr. Ts. Erdenebat	Specialist, FRDC	
26	Mr. B. Bat-Ochir	Specialist, FRDC	
27	Mr. N.I derkhangai	Specialist, FRDC	
28	Mr. G. Urantuya	Specialist, FRDC	
29	Ms. B. Tsendsuren	Head of the National CDM Unit, CCCO	
30	Ms. Ts. Battsetseg	Specialist of the CCCO	
31	Ms. B. Tegshjargal	Specialist of the CCCO	
32	Mr. Bayarsaikhan	Senior officer of the Department of Light Industry Policy Coordination, MIA	
33	Prof. Baatarbileg	Head of the Forestry Department, NUM	

34	Dr. Gerelbaatar	Lecturer, NUM	
35	Dr. Enkhbaatar	Director of the Institute, UST	
36	Mr. Ganbaatar	Lecturer, UST	
37	Ms. Bayartsetseg	Lecturer UST	
38	Mr. J. Tsogtbaatar	Director of the Institute of the Geo-Ecology, MAS	
39	Mr. Battulga	Researcher of the Institute of the Geo-Ecology, MAS	
40		Researcher of the Institute of the Geo-Ecology, MAS	
41	Mr. Dorjsuren	Senior Researcher of the Institute of the Botany, MAS	
42	Mr. Tsog	Senior Researcher of the Institute of the Botany, MAS	
43	Mr. Khudulmur	Director of the Environmental Information Centre, MEGD	
44	Ms. Z. Narangerel	Specialist, Environmental Information Centre, MEGD	
45	Ms. M. Bayasgalan	Head of the Division, Director of the Environmental Information Centre, MEGD	
46	Ms. Nandintsetseg	Specialist, Environmental Information Centre, MEGD	
47	Mr. U. Bolor	Director of the OHST LLC	99179688
48	Mr. Manlai	of the OHST LLC	
49	Mr. B. Altansukh	of the OHST LLC	
50	Mr. B. Bayarsaikhan	Director of the KhuvchiinKhoimor LLC	91912965
51	Ms. D. Oyuntsetseg	Director of the Oi Khaiguul LLC	99654103
52	Ms. B. Narangua	Specialist of the Oi Khaiguul LLC	
53	Mr. B. Javkhlantugs	Director of the Grand Forest LLC	99123322
54	Mr. U. Ganbat	Specialist of the Grand Forest LLC	
55	Mr. B. Bat-Erdene	Specialist of the Grand Forest LLC	
56	Mr. B. Ser-Od	Director of the New Green Forest LLC	89997889
57	Mr. D. Gansukh	Director of the Taigiin Shines LLC	99904116
58	Mr. Enkhshinejil	Engineer	
59	Mr. K. Schmidt-Corsitto	Director of the GIZ Programme	
60	Ms. Gereltuya	Officer of the GIZ Programme	
61	Mr. I. Hoelzle	Officer of the GIZ Programme	
62	Ms. Khishigsuren	Officer of the GIZ Programme	
63	Mr. R. Lufwig	GIZ Consultant	
64	Ms. G. Nyamjargal	FAO representative	
65	Mr. Dashzeveg	FAO National Consultant	
66	Mr. J. Scriven	FAO/UN-REDD	
67	Ms. B. Enkhtsetseg	UN-REDD National Facilitator	

Annex 3: Lists of activities for discussion groups

Potential activities for inclusion in the **Satellite Land Monitoring System** section of the Action Plan

Step 1: Institutional arrangements

Activity 1: Set clear for the implementation of the NFMS institutional arrangements:

- Definition of the institutional structure for national REDD+ coordination
- Definition of the institutional structure for national forest monitoring system coordination
- Definition of the institutional structure for the national communication to the UNFCCC
- Definition of the institutional structure for the Satellite Land Monitoring System (SLMS)
- Definition of the institutional structure for the National Forest Inventory (NFI)
- Definition of the institutional structure for the GHG Inventory (GHG-I)
- Definition of (the) structure(s) and responsible institution(s) for the quality assurance and quality control

Activity 2: Enact legally-binding institutional arrangements for the implementation and operation of the national forest monitoring system

Step 2: Capacity building of stakeholders

Activity 3: National awareness-raising workshop(s) on REDD+ and national forest monitoring systems for REDD+

Sub-activity 3.1: Overview of commitments to the UNFCCC, details of the evolution and structure of REDD+ and the principle of result-based positive incentives

Sub-activity 3.2: Overview of the different elements that can be evaluated by the "monitoring" function and definition of measurement needs and regular reporting of these elements

Sub-activity 3.3: Overview of existing options for measurement, reporting and verification for REDD+ activities and presentation of concrete examples from other countries

Sub-activity 3.4: Review of the framework of how existing laws and major socio-economic activities in the country have a direct or indirect influence on REDD+ and the NFMS; and definition of nationally-appropriate elements to be included in the monitoring function of the NFMS

Sub-activity 3.5: Based list of elements to be included in the monitoring function, assess how these indicators can be monitored , improved by legal or technical support, and how the tools of measurement , reporting and verification may be used to ensure that the monitoring function is designed effectively

Step 3: Assessment and definition of the monitoring function

Activity 4: Assessment and definition of criteria and indicators to be taken into account in the monitoring function, based on existing capacities of the country and in consultation with all stakeholders

Sub-activity 4.1: Define criteria and indicators to be included in the monitoring function

Sub-activity 4.2: Assess the capacity to monitor and generate data on the selected criteria and indicators

Sub-activity 4.3: Consult on the potential for improvement in order to have a consistent and transparent monitoring function and propose a timetable for implementation

Sub-activity 4.4: Assess existing and proposed systems / structures for monitoring and their suitability to ensure transparency, accessibility and sharing of data at national and international levels

Activity 5: Consult upon the design and type of REDD+ demonstration activities that will be implemented at the sub -national level, as a testing ground for the implementation of the NFMS

Step 4: Funding arrangements

It is critical to carry out a detailed assessment of the funding needed to ensure the long-term sustainability of an NFMS. All domestic and international sources of funding should be inventoried to assess which components of the NFMS are covered and where gaps exist. This funding analysis can serve as a domestic tool to support requests for national government funding and as a tool for requesting international support on specific work areas.

Activity 6: Inventory of available funding

Example template:

NFMS Activities	Source of funds	Amount secured (USD)	Financing period	Financing gap (USD)

Activity 7: Assessment of domestic financing needs and timeline and modalities for delivery of these funds

Activity 8: Assessment of the levels, sources and work areas of initial donor funding and the process required to transition to a sustainable self-financing arrangement

Activity 9: Development of a timeline of funding allocations and implementation process

Activity 10: National validation workshop of NFMS funding allocations and the implementation process

Activity 11: Formal adoption of the mechanism for allocating funds and the process of implementation (legal enactment where possible)

5.3. MRV function

5.3.1. Satellite Land Monitoring System

The SLMS is the tool within the NFMS used to collect activity data (AD) – data on land use and land use changes resulting from human activities.

The use of remote sensing data rather than field data to assess AD offers developing countries a way to assess historical changes in land use (dating back 20 years using freely available remote sensing data). The use of remote sensing also facilitates the reduction of the quantity and therefore the cost of ground-based measurements (e.g. for validation) for the assessment of AD.

During early implementation, the main results of SLMS in terms of reporting requirements will be:

- A 'starting point' matrix for the SLMS that describes national land use for the year in which the SLMS is established;
- A 'reference' matrix that describes changes between a reference year and the 'starting point' matrix (i.e. historical analysis);
- An annual matrix of land use change;
- An annual conversion matrix that accounts for changes between land use sub-categories in detail.

This section presents the activities that a country could consider implementing to develop a SLMS.

Step 1: Official launch of the SLMS

Activity 1: National workshop for the official launch of the SLMS

Sub-activity 1.1: Develop terms of reference of the workshop

Sub-activity 1.2: Identify participants and speakers

Sub-activity 1.3: Rental of office space for an SLMS laboratory, purchase of office supplies

Sub-activity 1.4: Official launch workshop

Activity 2: Establishment of SLMS laboratory and purchase of equipment

Step 2: Recruitment and training of staff

Activity 3: Selection and recruitment of technical staff with predictable funding and stable contracts

Sub-activity 3.1: Call for applications at national level

Sub-activity 3.2: Screening and testing of candidate skills in remote sensing and GIS

Sub-activity 3.3: Selection of the most appropriate candidates and recruitment

Activity 4: Training of technical staff

Step 3: Analysis of historical changes in land use

This step requires the analysis of historical land use changes using available satellite imagery.

Activity 5: Production of a guidance document on remote sensing techniques used for the analysis of IPCC land use categories, including the use of open-source software

Activity 6: Characterization of satellite images for monitoring forest

Sub-activity 6.1: Assess the availability of satellite images for the country and for different time periods of interest

Sub-activity 6.2: Evaluate 1) the quality of the data in terms of spatial and temporal coverage, cloud cover, spatial and spectral resolutions; and 2) the possibility of exchanging between different spatial coverage to limit the influence of cloud cover and improve resolution

Sub-activity 6.3: Assess the impact of the available spatial resolution for the identification of deforestation and degradation

Sub-activity 6.4: Make recommendations for the development of forest stratification and monitoring of REDD+ activities

Activity 7: Set a national historical reference period; collect and archive all existing land use data

Sub-activity 7.1: Identify all remote sensing and GIS data partners

Sub-activity 7.2: Facilitate the sending of a letter from [the Minister] to data partners to invite them to share their data

Sub-activity 7.3: Create a database for spatial data centralization

Sub-activity 7.4: Collect and digitize (as necessary) all existing data

Sub-activity 7.5: Analyze available data and propose a historic land use reference (numerous proposals for the national historical reference may be offered depending on the quality of available data and national circumstances , but only one proposal can be selected)

Activity 8: National consultation workshop on the adopted approach to assessing historical land use

Activity 9: Compilation of the historical composite land use map and initial analysis using manual delineation of forest polygons

Step 4: Setting a national land use reference (time = 0)

After defining the composite reference land use map, it should be used as the national reference land use map against which the results of REDD+ activities are analyzed.

Activity 10: Analysis of available data/information and development of a proposed for developing the national land use reference map

Activity 11: National workshop to define national land use reference map

Activity 12: Development of the composite reference land use map and carry out initial analysis with manual delineation of forest polygons

Step 5: Update polygons in the reference land use map (from time = 0 to time = 1) and report

Annual analyzes from time = 0 (time = 1 for first year; time = 2 for second year; etc.)

Activity 13: Update polygons from the reference map from time = 0 to time = 1 to assess the impact of REDD+ activities

Sub-activity 13.1: Assembly of the composite images for time = 0 and time = 1

Sub-activity 13.2: Delineate the boundaries of polygons defining forests and REDD+ activities for time = 0 and time = 1

Sub-activity 13.3: Analyze the differences between time = 1 and time = 0; and time = 0 and the historical reference map

Sub-activity 13.4: Produce data tables of the results of the changes and publish online

Sub-activity 13.5: Initial preparation of a national report on land use changes to be included in the national communication to the UNFCCC

Step 6: Launching the SLMS and its web interface

Activity 14: Establishment of a server for the web interface; recruitment and training of staff

Sub-activity 15.1: Recruitment and training of SLMS and web interface operators

Sub-activity 15.2: Define technical parameters for server device (server, internet connection, logistics, server room power)

Sub-activity 15.3: Tender for the supply and installation of server equipment

Sub-activity 15.4: Award tender; server installation

Sub-activity 15.5: Operationalize SLMS, online interface; carry out maintenance and undertaken ongoing analysis of land use changes

Activity 14: Launch of the SLMS

Sub-activity 14.1: National workshop to present the web interface

Sub-activity 14.2: Production of a report of the launch workshop, and distribution for comments

Sub-activity 14.3: Consideration of public comments and adjusting/setting parameters for the web interface

Potential activities for inclusion in the **National Forest Inventory** section of the Action Plan

Step 1: Official launch of the NFI

Activity 1: National workshop official launch of the NFI

Sub-activity 1.1: Develop workshop terms of reference

Sub-activity 1.2: Identify participants and speakers

Sub-activity 1.3: Room reservation, purchase of office supplies

Activity 2: Establishment and equipping of a national laboratory and creation of a centralized database

Step 2: Recruitment and training of staff

Activity 3: Technical staffing proposal based on predictable funding and stable contracts

Sub-activity 3.1: Call for applications at national level

Sub-activity 3.2: Screening of applications and testing of candidate skills

Sub-activity 3.3: Selection of candidates and recruitment

Activity 4: Training of technical staff on the measurement of forest carbon stocks

Sub-Activity 4.1: Training on forest inventories

Sub-Activity 4.2: Training on IPCC Good Practice Guidance for the measurement of forest carbon stocks

Sub-Activity 4.3: Training on descriptive statistics

Sub-Activity 4.4: Training on Geographical Information Systems (GIS)

Sub-Activity 4.5: Training on the development of allometric equations

Sub-Activity 4.6: Training on the processing and analysis of inventory data (including the use of open source software)

Step 3: Development of the NFI methodology

Activity 6: Establishment of an official national definition of forest

Sub-activity 6.1: Review of the literature and criteria for defining forest land

Sub-activity 6.2: Review of national legislation and existing forest definition(s)

Sub-activity 6.3: Assessment of the adequacy of the national forest definition in the specific context of REDD+ (e.g. appropriateness for monitoring purposes)

Sub-activity 6.4: Formulation of a national forest definition appropriate for REDD+

Sub-activity 6.5: Development of criteria and indicators, easily measurable in the field, for the monitoring of forest land

Sub-activity 6.6: National validation workshop for the national forest definition

Sub-activity 6.7: Formal legal adoption of the national forest definition

Activity 7: Needs assessment for the development of national EFs for the various categories of land use

Sub-activity 7.1: Needs assessment for allometric equations to report EFs at Tier 3 in the national GHG inventory

Sub-activity 7.2: Evaluate the possibility of obtaining the relevant equations from regional sources

Sub-activity 7.3: Decision on which IPCC tier will used to report on for different forest carbon pools

Activity 8: Review of existing NFI methodologies

Sub-activity 8.1: Evaluate existing NFI methodologies in the region

Sub-activity 8.2: Estimate the cost of different NFI methodologies

Sub-activity 8.3: Evaluate the capacity (necessary and available) to develop and implement an NFI

Sub-activity 8.4: Make recommendations for the NFI methodology

Activity 9: Conceptualization of NFI multipurpose

Sub-activity 9.1: Identifying objectives of the NFI multipurpose

Sub-activity 9.2: Identify the non-timber/carbon parameters/variables to be estimated/measured

Activity 10: Develop the multipurpose NFI methodology

Sub-activity 10.1: Preliminary assessment of forest areas and stratification of forest land (based on SLMS data). This step will quantify and georeference the following data:

- *Spatial distribution and extent of land use categories and sub-categories*
- *Distribution and area of each forest stratum/population*
- *Distribution of forest management methods*
- *Distribution of REDD+ activities*

Sub-activity 10.2: Development of pre-sampling with consideration of the following:

- *Sampling approach and method*
- *Number of samples*
- *Distribution of samples*
- *Design and layout of field plots*
- *What to measure and measurement protocols*

Activity 11: Finalize the NFI methodology

Sub-Activity 11.1: Develop a final document including methodological and budget proposals

Sub-activity 11.2: Share methodology with all partners for comments and improvements

Sub-Activity 11.3: National workshop for the validation of the methodology

Sub-activity 11.4: Formal/legal endorsement of the methodology by the department/ministry

Step 4: Development of NFI field manuals

Activity 12: Development of NFI field manuals

Sub-activity 12.1: Develop and draft field manual format/methodology

Sub-activity 12.2: Share draft with all partners for feedback

Sub-activity 12.3: Validation workshop

Sub-activity 12.4: Formal adoption by the department/ministry

Step 5: Centralization of existing NFI data

Activity 13: Identification and centralization of existing data

Sub-activity 13.1: Identify all potential data partners (governmental, NGOs, universities, etc.)

Sub-activity 13.2: Letter from [the Minister] to all data partners

Sub-activity 13.3: Create a database for data centralization and incremental archiving of data

Sub-activity 13.4: Collect (and digitize, as appropriate) relevant data

Sub-activity 13.5: Quality control and harmonization of data

Activity 14: Harmonized analysis of existing data

Sub-activity 14.1: Data analysis

Sub-activity 14.2: Interpretation of results

Sub-activity 14.3: Communication of results

Activity 15: Analysis of regional data

Sub-Activity 15.1: Review of the literature

Sub-Activity 15.2: Assessment of data availability

Sub-Activity 15.3: Assessment of potential economies of scale

Step 6: Implementing a pre-inventory

Activity 16: Operational planning for field implementation/data collection

Sub-Activity 16.1: Determine number and distribution of field plots

Sub-Activity 16.2: Assess cost of implementation based on the number and distribution of field plots and opportunities to enhance cost-effectiveness while retaining statistical robustness of the methodology

Activity 17: Fieldwork (piloting)

Activity 18: Analyze and verify data and estimate the variability within forest strata

Step 7: Implementation of the full NFI

Activity 19: Operational planning for field deployment

Sub-Activity 19.1: Determine the number and distribution (location) of field plots

Sub-Activity 19.3: Assess cost depending on the number and distribution of sampling plots

Activity 20: Training at national level on the implementation of the methodology

Activity 21: Establish and equip decentralized NFI stations/offices

Activity 22: Identify and train team leaders

Activity 23: Recruit field crew staff

Activity 24: Train field crew staff

Activity 25: Field implementation (including any necessary activities to develop allometric equations)

Activity 26: Centralize and harmonize data field

Activity 27: Independently verify and analyze field data

Step 8: Evaluation of forest carbon stocks

Activity 28: Development of allometric equations based on forest types

Activity 29: Compile carbon stock data according to forest types

Activity 30: Disseminate results

Potential activities for inclusion in the **greenhouse gas inventory** section of the Action Plan

Step 1: Official launch of the national GHG inventory

Activity 1: Inception Workshop of I- GHG and stakeholder awareness

Sub-activity 1.1: Development of terms of reference for the workshop

Sub-activity 1.2: Identify workshop participants and speakers

Sub-activity 1.3: Make logistical arrangements for the workshop

Sub-Activity 1.4: Implement workshop

Sub-Activity 1.5: Produce workshop report

Activity 2: Establish and equip a GHG inventory laboratory

Sub-activity 2.1: Identify tools and software for the processing and compilation of GHG data

Sub-activity 2.2: Purchase identified tools and software

Sub-activity 2.3: Create a centralized GHG database and archiving system

Sub-activity 2.4: Calculate costs for equipment maintenance and identify sustainable funding sources

Step 2: Recruit and train staff

Activity 3: Develop technical staffing proposal with sustainable funding and stable contracts

Sub-activity 3.1: National-level call for applications / vacancy announcements

Sub-activity 3.2: Screen and testing the skills of candidates

Sub-activity 3.3: Selection and recruit most appropriate candidates

Activity 4: Train technical staff

Training should cover (at least) the following issues and methods:

- IPCC guidance and guidelines for GHG inventory (with a focus on the land use, land use change and forestry sector)
- Use of GHG inventory tools and software (including the US Environmental Protection Agency's 'Agriculture and Land Use' (ALU) software)
- Collection, compilation and analysis of GHG-related data
- Estimation of uncertainties
- Quality assurance and quality control (QA/QC) procedures
- Reporting to the UNFCCC

Step 3: Definition of the national GHG inventory methodology for REDD+

Activity 5: National workshop for the definition of the REDD+ GHG inventory methodology

Sub-activity 5.1: Develop terms of reference

Sub-activity 5.2: Identify workshop participants and speakers

Sub-activity 5.3: Arrange high-level invitation for stakeholders and partners

Sub-activity 5.4: Make logistical arrangements for the workshop

Sub-Activity 5.5: Implement the workshop

Sub-activity 5.6: Write workshop report proposing a consensus for a national reference methodology

Activity 6: Formal adoption of the GHG inventory methodology by the Ministry

Step 4: Completion of the GHG inventory

Activity 7: Implementation of the national GHG inventory

Sub-activity 7.1: Collection of activity data and emission factors, data entry in the ALU (or other selected) software, preliminary analysis and evaluation of results

Sub-activity 7.2: Selection of an independent external audit team

Sub-activity 7.3: Verification of a representative sample of field measurements

Sub-activity 7.4: Verification of a representative sample of the raw data transmitted to the central database

Step 5: Production of national GHG inventory results

Activity 8: Assess uncertainties of GHG emissions estimates

Activity 9: Carry out quality assurance / quality control of the data

Activity 10: Independent review of the national GHG inventory before reporting

Activity 11: Submission of the national GHG inventory

GHG inventory report to include:

- Information on the types of land use sub-categories and sub-divisions and detailed emissions and removals for each sub-division
- Information on the methods used to calculate emissions and removals
- List of the activity data used to calculate emissions and removals, including the values, units and years and references of these data
- List of emission and removals factors used to calculate emissions and removals in each category/sub-division, including the values, units and reference data
- Specification of the year for which emissions and removals estimates are made, and the associated error