



# Measurement, Reporting and Verification (MRV) and Green House Gas (GHG) reporting to support REDD+ in Zambia Workshop

## Proceedings



28<sup>th</sup> to 30<sup>th</sup> May, 2012

Kafue Gorge Training Centre, Zambia

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## ACRONYMS

- AFOLU Agriculture Forestry and Land Use
- CH<sub>4</sub> Methane
- CO Carbon monoxide
- CO<sub>2</sub> Carbon dioxide
- COP Conference of Parties
- CSO Central Statistical Office
- DoE Department of Energy
- ECZ Environmental Council of Zambia
- EFDB Emission Factor Database
- EPA Environmental Protection Agency
- FAO Food Agricultural Organisation
- GHG Greenhouse Gases
- GIS Geographical Information System
- GPS Geographical Positioning System
- IPCC Intergovernmental Panel on Climate Change
- LUCF Land Use Change and Forestry
- LULUCF Land Use, Land Use Change and Forestry
- MRV Measurement, Reporting and Verification
- N<sub>2</sub>O Nitrous oxide
- NAMA Nationally Appropriate Mitigation Actions
- NMVOC Non-methane volatile organic compound
- NO<sub>x</sub> Nitrogen oxides
- NPC National Project Coordinator
- PFAP Provincial Forestry Action Programme
- RS Remote Sensing
- UNDP United Nations Development Programme
- UNEP United Nations Environment Programme
- UNFCCC United Nations Framework Convention on Climate Change
- REDD+ Reducing Emissions from Deforestation and forest Degradation in Developing countries
- UN-REDD United Nations Initiative to Reduce Emissions from Deforestation and forest Degradation in Developing countries

## EXECUTIVE SUMMARY

Contained herein are the proceedings of the training workshop held in Kafue Gorge from the 28<sup>th</sup> to the 30<sup>th</sup> May 2012. This training is a continuation of earlier training in GIS and MRV for the cohort of 47 technicians from Lusaka and Provinces; firstly the cohort of technicians were trained in GIS during the period 12<sup>th</sup> to 23<sup>rd</sup> March at the National Remote Sensing Centre, 2012 and later had refresher GIS training during the installation of Provincial GIS offices during the period 10<sup>th</sup> to 25<sup>th</sup> May 2012. These capacity building efforts targeted cross-sectorial technicians from all Provinces of Zambia, in line with Government of Zambia's Decentralisation policy. The overall workshop objective was to build capacity in Measurement, Reporting and Verification (MRV) including Green House Gas (GHG) reporting to support REDD+ programme in Zambia. Participants were drawn from a varied array of government departments, NGOs and parastatal institutions from across the nation (Annex 1). Future training of this cohort will occur during deployment of GPS units to the Provincial GIS offices during July 2012.

Specific objectives for the workshops were; to introduce and define the scope of REDD+ from UNFCCC meetings and forest carbon measurement requirements under the IPCC and to define UNFCCC, IPCC, MRV for REDD+ and GHG reporting for Forests to support REDD+. Other specific objectives were to undertake an institutional capacity assessment for MRV and GHG assessment in Zambia; identify capacity gaps and needs for targeted capacity building in the near future and lastly to enable the construction of an MRV roadmap for Zambia. Workshop outcomes were a cohort of technicians trained in concepts of REDD+, MRV and GHG reporting coupled with an institutional capacity assessment, identification of capacity gaps and development of the initial roadmap of an MRV system for Zambia.

The Director of Forestry, Mrs. Anna M. C. Masinja officially opened the workshop and urged the participants to explore the sources of Green house Gas emissions from Land use Land Use Change and Forestry in Zambia to help address the drivers of deforestation. She also urged participants to discuss freely and participate actively in the development of an MRV roadmap for Zambia (See Annex 3 for the Director's Speech).

Technical sessions were delivered using a participatory approach following the workshop programme (Annex 2). The core business started with an introduction to the terminology of REDD+ and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks. The plenary presentation by Professor Yamba provided an overview of climate change science, forest carbon, and the role of forests in the carbon cycle and forest degradation. This included an overview of National GHG Inventories and reporting format focusing on requirements, legal, institutional and procedural arrangements, inventory objectives, GHG reporting gases, estimation methodology. An elaboration on how greenhouse gases are formed and the role played in global warming was made. Reporting requirements under the United Nations Framework Convention on Climate Change were presented; highlighting the need for all parties' accountability to greenhouse gases emitted.

A presentation on MRV and GHG accounting was given as applied within the UN-REDD programme; explaining that FAO provided support to countries on technical issues related to forests as well as for developing credible and efficient Monitoring and Measurement, Reporting and Verification (MRV) functions of their National Forest Monitoring systems (NFMSs). Emphasis was made that at the

international level, FAO aimed to support discussions on principles and guidelines of M & MRV for REDD+. Another presentation highlighted United Nations Framework Convention on Climate Change (UNFCCC) adopted as the basis for a global response to the climate change problem; with the ultimate objective being to stabilize GHGs concentrations in the atmosphere to a level preventing dangerous human interference with the climate system. Additionally, the Intergovernmental Panel on Climate Change (IPCC), a scientific body mandated to review and assess the most recent scientific, technical and socioeconomic information produced worldwide relevant to the understanding of climate change. A statement was made that the IPCC provided guidelines and methodologies for calculating GHG emissions.

Group work and plenary presentations (herein reflected) formed the core of working modalities for the workshop providing a highly interactive atmosphere. Group work included a discussion of the role of remote sensing in MRV, and available institutions and the identification of gaps for remote sensing analysis in Zambia. Another group tackled forest monitoring using GIS, identified institutions, strengths and weakness as well as gaps. Yet another group dealt with forest carbon assessment, again identified institutions including their roles, strengths and weaknesses while another groups dealt with GHG reporting and establishing a Reference Emission Level, identifying responsible stakeholders as well as strengths and weaknesses. Lastly all groups worked on the MRV road map, streamlined the implementation pathway, identified needs and capacities required to achieve implementation, and indicated interdependencies.

A brief presentation on TERRA AMAZON was given; sharing the Brazilian experience on a forest monitoring system as an option currently being studied and evaluated for possible adoption for forest monitoring in Zambia.

The way forward session made a number of recommendations. Major among the recommendations was the need for the country formalise institutional arrangements for an MRV system for GHG reporting. The collection of activity data and emission factors were identified as key in establishing a Zambian MRV system. Another recommendation was the identification of institutions with capacity to collect data related to activity data, emission factors, GHG emissions and reference emission levels.

Another recommendation outlined the need to update Zambia's policies and legislation in order to take into account emerging issues such as climate change, trans-boundary trade and participatory forest management in order to attract investment into the sector and lastly that participatory approaches should be adopted at all levels of REDD+ Projects.

## 1.0 INTRODUCTION

This report constitutes the proceedings of the training workshops held in Kafue Gorge during the period 28<sup>th</sup> – 30<sup>th</sup> May 2012. The overall objective was to build capacity in Measurement, Reporting and Verification (MRV) and Green House Gas (GHG) reporting to support REDD+ in Zambia. Capacity building targeted cross-sectorial technicians from Lusaka and other Provinces of Zambia.

The UN-REDD programme for Zambia was approved by the UN-REDD Policy Board for implementation in 2010 with a total budget of US\$ 4.49 million to be implemented for a period of 3 years. It will be implemented with support from the three U.N. agencies (FAO, UNDP and UNEP) that are part of the partnership.

REDD+ is an international initiative aimed at enhancing the value of standing forests and incentivise sustainable forest management through multi-stakeholders approach.

During the REDD+ readiness process (UN-REDD Programme), in order to benefit from the initiative, Zambia will have to undertake the following actions:

- Develop a National Strategy or Action Plan to reduce deforestation;
- Develop a robust and transparent national forest monitoring system for the monitoring and reporting of the REDD + activities (interim measure at sub national)
- Develop a national forest reference emission level and/or forest reference level (interim measure at sub national)
- A system for providing information on how the safeguards on local community and forest biodiversity are being addressed and respected throughout the implementation of the REDD+ activities while respecting sovereignty;

The readiness process for Zambia involves the development of a national strategy to reduce deforestation and forest degradation. To achieve the said objective, a cohort of 47 technicians trained in GIS (12<sup>th</sup> to 23<sup>rd</sup> March, 2012) and with follow up training facilitating the installation of Provincial GIS offices (10<sup>th</sup> to 25<sup>th</sup> May) was the target for this training workshop. These were drawn from a varied array of government departments, NGOs and parastatal institutions from across the nation (Annex 1). The workshop proceedings followed the programme reflected in Annex 2.

### 1.1 Specific Objectives

The specific objectives for the workshop were as follows:

- I. Introduce and define the scope of REDD+ from UNFCCC meetings
- II. Introduce and define UNFCCC and IPCC
- III. Introduce forest carbon measurement, and requirements under the IPCC
- IV. Introduce and define MRV for REDD+
- V. Introduce and define GHG reporting for Forests to support REDD+
- VI. Undertake an institutional capacity assessment for MRV and GHG assessment in Zambia
- VII. Identify capacity gaps, and needs for targeted capacity building in the future
- VIII. Start building an MRV roadmap for Zambia

## 1.2 Expected Outcomes

While the expected outcomes were;

1. A cohort of technicians trained in the concepts of REDD+, MRV, and GHG reporting
2. An institutional capacity assessment for MRV and GHG, and identification of capacity gaps
3. The initial development of an MRV roadmap for Zambia

The workshop was officially opened on Day Two with a welcome note from the facilitator which was followed by individual introductions in order to break the ice. Each participant was asked to mention their full names, where they come from, their status/what they do and what they liked most and why.

## 2.0 OFFICIAL OPENING REMARKS AND SPEECH BY THE DIRECTOR OF FORESTRY

The Director of Forestry, Mrs. Anna Masinja officially opened the workshop by giving brief remarks followed by a speech. In her opening remarks, she stated that it is important to allay people's fears that REDD+ implementation in Zambia was proceeding at a slow pace. To the contrary, the programme is on course, as Zambia is just in the first phase of REDD+ preparedness which requires that the national strategy document on REDD+ is prepared. She said this requires a lot of consultation and capacity building to set the baseline for implementation of the programme's second phase.

The Director also stated that policy to regulate REDD+ in the country is in the forming and that officers should be wary of unscrupulous businessmen purporting to be trading in carbon and acquiring tracts of land from unsuspecting community members. She said this should be discouraged. She stated that instead, forestry officers should look at REDD+ as an opportunity and as a core programme for sustainable forest resource management. It should be used as an opportunity to undertake forest resource assessments. The Director emphasized the need to work as a team with other core institutions that have been incorporated into the programme.

In her speech the Director stated that although REDD is a new name, the activities to ensure reduced deforestation and forest degradation are well known to all forestry staff and include conservation agriculture, community based natural resource management, joint forest management, sustainable energy projects (solar, improved stoves, etc.), enhancing policy and legislative frameworks. Therefore, REDD calls for an integrated approach to forest and land management and requires that staff from different institutions at provincial level work together.

The speech stressed the multifaceted nature of the deforestation and forest degradation problem in Zambia and that understanding the drivers of deforestation and sources of greenhouse gas emissions in land use, land use change and forestry will enhance the country's capacity to effectively monitor the sources and potential changes. This will enable Zambia to plan its development by addressing drivers of deforestation. The workshop is an opportunity to develop an MRV roadmap that would contribute to ensuring that Zambia becomes ready to implement the REDD programme.

See Annex 3 for the talking notes for the Director of Forestry at Kafue gorge training centre.



## 2.1 Expectations and Fears

After the introductions participants were asked to get two post-it-cards each and write independently on the fears and expectations they had for the workshop. This was followed by posting cards on the wall and reading the fears and expectations. See responses below.

### PARTICIPANTS EXPECTATIONS

Before presentation of the workshop objectives, participants gave their expectations. The participants' expectations included the following:

- To learn and be able to apply the concepts of MRV and GHG reporting
- To acquire knowledge and skills on GHG measurement and reporting criteria to be used in Zambia
- To gain a better understanding of the UNREDD+ programme
- To have a clear understanding of MRV
- To understand the relationship between UNREDD and ILUA
- To be equipped with knowledge on MRV and GHG reporting
- To be given tasks to undertake in the provinces based on the workshop content
- To know the objectives of REDD and what stage we are at so far
- To learn how the world will arrest global warming
- To understand MRV methodologies under REDD+
- To understand how to measure and calculate carbon credits
- To understand what climate change is and the effects of GHG
- To understand the implementation mechanism for the programme
- To begin implementation of REDD+ after the workshop
- To understand how to measure the emission of carbon
- To understand how REDD+ will change the local people's mind-set towards forest conservation

### PARTICIPANTS' FEARS

The following are the fears expressed by the participants regarding the workshop:

- Complexity of the issues under discussion
- Centralized activities for MRV and GHG (at National and provincial levels)
- Not to get what I expect
- After REDD+ Forestry Department may not continue with project activities
- Skills and knowledge gained may not be used practically
- UNREDD might be another academic exercise
- Time may not be enough to run through the loaded programme
- High levels of deforestation in the country
- To end up with training and no implementation
- REDD+ heavily centralized
- REDD+ programme will be an academic exercise and no impact on communities depending on the forests
- No resources such as vehicles for use in the implementation of MRV
- We may never implement what we will learn
- Time inadequate
- Gaps in the implementation of UNREDD programme will make the programme fail like other programs such as Provincial Forestry Action Programme (PFAP)

## 2.2 House Norms

Ground rules were put in place in order to govern the proceeding of the workshop on the flip chart as shown in the figure.

## 3.0 RESOURCES PERSONS' PRESENTATIONS

### 3.1 Introduction to REDD By NPC Coordinator

The terminology of REDD+ was given by Mr D. Kasaro as Reducing Emissions from Deforestation and forest Degradation in Developing countries, and the role of conservation, sustainable management of forests and the enhancement of forest carbon stocks in developing countries. The presentation elaborated the role that forests play in the global carbon cycle and their contribution to the mitigation of climate change through carbon sequestration, carbon substitution, and carbon conservation.

Forests have been identified as key in carbon emissions because of their capacity to act as carbon sinks or sources. The Intergovernmental Panel on Climate change (IPCC) states that approximately 20% of emissions are from land use change (mainly deforestation).

However, despite the role that trees play in addressing climate change, forests have had a complex history in the international climate negotiations. Some of the complexities include:

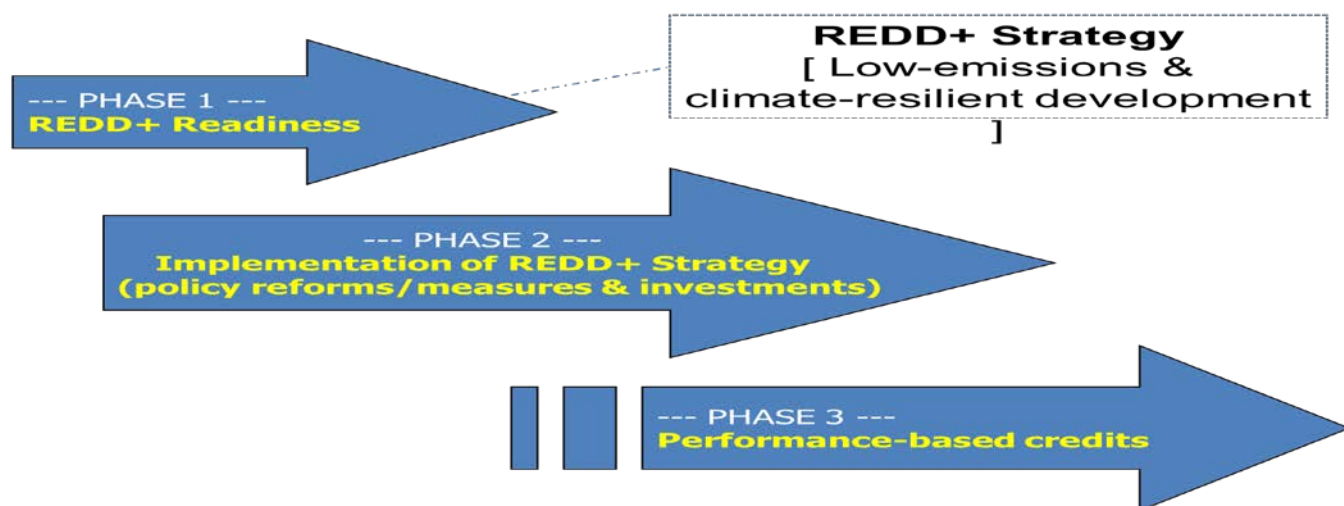
- Emissions from forest loss are hard to measure, monitor and control (additionally and measurement).
- Benefits from efforts to reduce emissions may be short-lived (permanence issue) and suffer leakage (reduced emissions in one place linked to increased emissions in another place).
- Focusing on deforestation in developing countries reduces pressure on developed countries to cut their own emissions.
- Including forests in trading schemes would flood carbon markets and make other types of measures to reduce emissions unprofitable.

The presentation stressed that the UNREDD programme provides an opportunity for countries like Zambia to access the benefits from carbon trade, deal with challenges of climate change and enhance sustainable forest management for the country's development. However much more still remains to be done as Zambia is only in the first stage of REDD plus implementation. The three stages were given as shown in the figure below:

### Workshop Norms

'Ground rules' were drawn up by the participants at the start of the workshop.

- Respect one another's' opinion
- Speak freely
- No smoking
- Put phones on Vibration
- Put your status in your pocket
- There are No wrong Answers from Adults
- Keep to time
- No choking when your friend is on the floor
- No unnecessary movements
- Be happy
- Speak thru the Chairperson



An overview of forest resources in Zambia was also presented including the challenges being faced in the management of these resources. What is clear is that based on the information available, the rate at which the country's forest resources are being lost is high and need to be addressed.

### 3.3.1 Issues Arising From and Discussion of the Presentation

Participants requested for clarification on what type of data would be needed from different sectors for input into the GIS system that would enhance the MRV process.

It was explained that the various sectors that directly or indirectly contribute to deforestation and the emission of greenhouse gases would be required to submit digital data showing the extent of the activities and projected developments in the various sectors that would impact on deforestation. In order for the country to effectively plan and account for its GHG emissions from deforestation, all sectors that have an impact on sustainable forest management must account for their activities and planning and information should be packaged in totality and not leave Forestry Department to operate in isolation. Examples given were digital data from the Agricultural sector showing areas of agricultural activity as well potential areas for agriculture expansion, areas for future land development, sources of energy, areas for future land resources development such as for mining and oil exploration. The NPC coordinator explained that the best place to start for the provincial teams would be to consider the data sets that were provided together with the GIS equipment and then build on that.

Some participants expressed worry on obtaining information from Ministry of Mines. It was explained that so far, the Mines department has given details and the department has been engaged and is expected to cooperate in providing the required data.

Further issues raised related to who determines the profitability of the carbon trade and the parameters being used to determine costing and profitability, what government's commitment is regarding community engagement and provision of extension activities to ensure that all actors are on the same platform of understanding the implications of deforestation as it relates to the REDD concept, and the issue of carbon tax being paid to Road Traffic and Safety Agency (RTSA) instead of being invested into activities that reduce emissions such as reforestation.

The responses that were given to the above issues are that Zambia needed to update its policies and legislation in order to take into account all these emerging issues such as climate change, trans-boundary trade and participatory forest management in order to attract investment into the sector. The Director of Forestry explained that currently, there is a lot of political will to support these efforts and create an enabling environment for the forestry sector to flourish. Government's commitment therefore includes undertaking institutional and legal reforms, promoting alternative livelihoods that ensure reduced dependency on forests and optimal utilization of land such as Bee keeping and Agroforestry.

Mr. Kasaro explained the two systems of carbon trade as regulated (CDM) and Voluntary. He explained that where these have been tried; it was found that profits realised were not enough to put up viable projects. He explained that although the money from the credits is for communities, they need to be assisted in developing viable livelihoods. Investment is needed in alternative energy sources especially for the urban dwellers.

On the question of the Kyoto Protocol's commitment to ensure that all the largest polluters oblige to compensate for the sacrifice that the developing countries especially in Africa are making with regards to preservation of trees as carbon sinks.

It was explained that the Kyoto protocol is an international commitment and whether a country pollutes more or less, they are required to be part of the collective agreement. Zambia therefore does not operate in isolation but is party to the African Position. It was further explained that developing countries are not legally bound to account for their emissions but they can negotiate for compensations for their part in conserving trees and reducing deforestation.

### **3.2 Overview of Climate Change Science, Forest Carbon and National GHG Inventory & Reporting Format.**

*This session was co-presented by Prof .Francis Yamba and Dr. Julian Fox*

#### **3.2.1 Climate Change and Forest Carbon**

The presentation included an overview of the science of climate change and forest carbon, the role of forest in the carbon cycle, and forest degradation. It then covered an overview of National GHG Inventories and reporting format focusing on requirements, legal, institutional and procedural arrangements, objectives of the inventory, GHG reporting gases, estimation methodology and reporting format.

On the science of climate change and forest carbon, the role of forest in the carbon cycle, the presenter elaborated on how the greenhouse gases are formed and the role they play in global warming. The most important fact to note is that it is the presence of greenhouse gases in the atmosphere is leading to global warming and climate change and the largest contributing source of greenhouse gas is the burning of fossil fuels leading to the emission of carbon dioxide. Forests have been found to be a significant source of carbon emissions. This is because trees have the capability to absorb carbon which is later emitted into the atmosphere when the trees are cut down (figure 1.1).

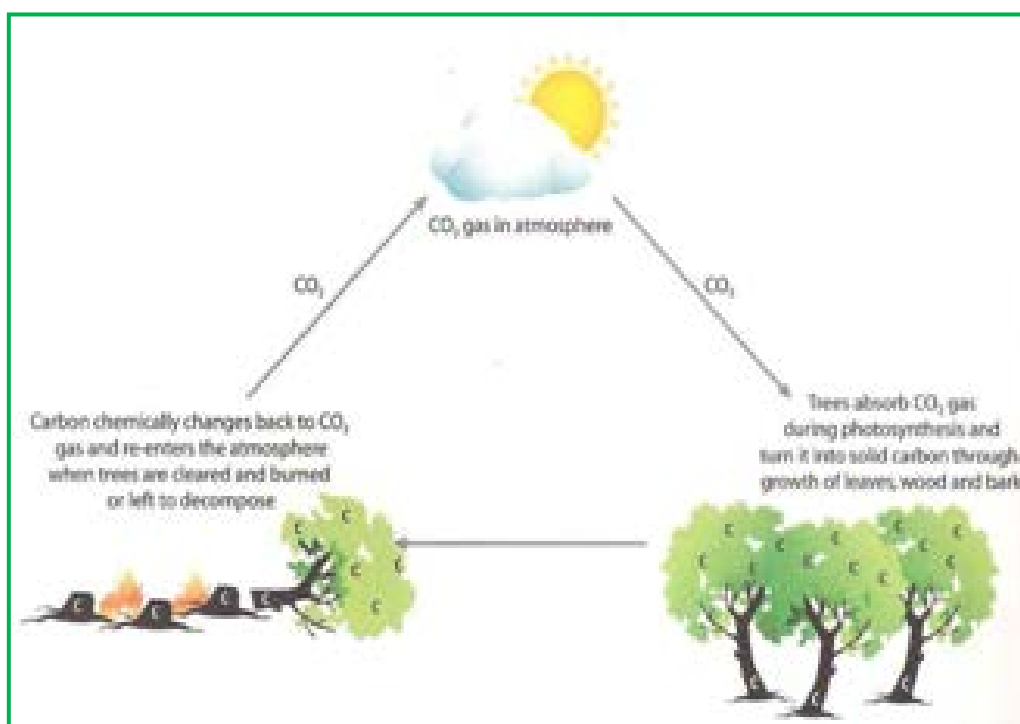


Figure 1.1: Simplistic diagram of trees and carbon cycle. Source: N.Virgilio,TNC

Overall forests emit approximately 17% of the global greenhouse gases through deforestation and forest degradation. The highest emitters are energy supply and industrial emissions accounting for 26% and 19% respectively. (For more details refer to the Training Manual, May 2012)

### 3.2.2 National GHG Inventory and Reporting Format

Under the United Nations Framework Convention ON Climate Change, it is a requirement that all parties to the United Nations Framework Convention on Climate Change account for greenhouse gases emitted, and accounting for these gasses (in relation to Forest Lands) is also important for REDD+ implementation. It is therefore important that countries undertake GHG inventories. The required contents of national communications and the timetable for their submission are different for Annex I and non-Annex I Parties. This is in accordance with the principle of "*common but differentiated responsibilities*" enshrined in the Convention.

The commitments developed for the countries in the two categories differ. According to the UN system **Annex I Parties are required to:**

- Adopt policies and measures to limit the anthropogenic emissions of GHGs and protect/enhance their GHG sinks and reservoirs to demonstrate that they are taking the lead in modifying longer term trends
- Submit:
  - Their National communications every four years
  - Their National GHG inventory every year
- Provide new and additional financial resources to meet the agreed full costs incurred by developing country parties in complying with their obligations under article 12 (communication of information)

- Provide financial resources including transfer of technology to meet the agreed full incremental costs of measures to be undertaken by developing country parties for dealing with actions taken under the convention
- Promote, as appropriate the transfer of, or, facilitate and finance access to, environmentally sound technologies and knowhow to other parties, particularly the developing ones to enable them implement the provisions of the convention, while,

**Non-Annex I Parties are required to:**

- Report in more general terms on their actions to address climate change and to adapt to its effect.
- Undertake periodic reporting as part of the national communication including their GHG inventory information and no reviews are scheduled.

As a requirement, inventories have to include the following GHGs:

- Carbon dioxide (CO<sub>2</sub>)
- Methane (CH<sub>4</sub>)
- Nitrous oxide (N<sub>2</sub>O)
- Perfluorocarbons (PFCs)
- Hydrofluorocarbons (HFCs) and
- Sulphur hexafluoride (SF<sub>6</sub>)

Estimates should also include the following indirect GHGs: *Carbon monoxide (CO), nitrogen oxides (NO<sub>x</sub>), non-methane organic volatile compounds (NMVOC) and sulphur oxides (SO<sub>2</sub>).*

The inventory must cover the following sectors:

1. Energy
2. Industrial processes
3. Solvent and other product use
4. Agriculture
5. LULUCF (Land Use, Land-Use Change and Forestry)
6. Waste

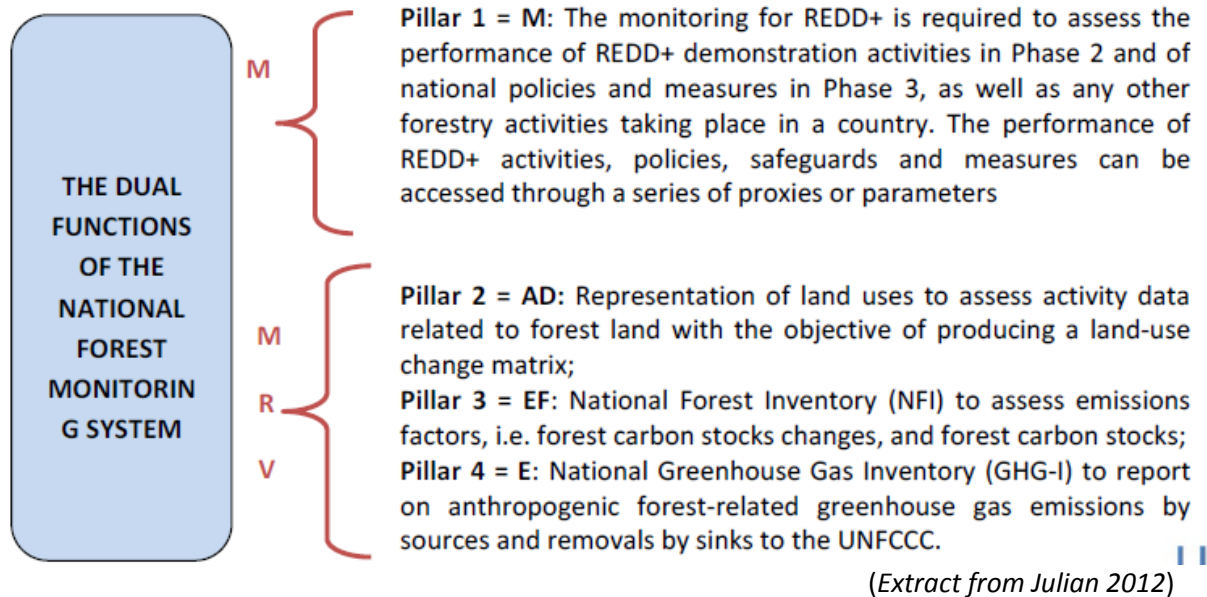
*International aviation and marine bunker fuel emissions are not to be included in national total and are reported separately.* Each of these sectors is subdivided into different source/sink categories. Emissions and removals have to be reported at the most disaggregated level of each source/sink category.

### **3.3 MRV and GHG**

*Dr. Julian Fox* presented on MRV and GHG where he explained that, within the UN-REDD programme, FAO provides support to countries on technical issues related to forests as well as for developing credible and efficient Monitoring (M) and Measurement, Reporting and Verification (MRV) functions of their National Forest Monitoring systems (NFMSS). At the international level, it aims to support discussions on the principles and guidelines of M & MRV in international forum.

M and MRV for REDD+ is built on four pillars:

- Pillar 1: (M) monitoring for REDD+ to assess performance of REDD+ activities in phase two and national policies and measures in phase 3 as well as any other forestry activities taking place in a country
- Pillar 2: (AD) To assess activity data related to forest land with the objective of producing a land use change matrix
- Pillar 3: (EF) National forestry inventory to assess emissions factors that is forest carbon stock changes and forest carbon stocks
- Pillar 4:(E) National GHG to report on anthropogenic forest related GHG emissions by sources and removals by sinks to the UNFCCC



Further emphasis for monitoring was placed on the REDD+ safeguards which include respect for human rights, improving governance and protecting biodiversity.

According to the IPCC good practice guidelines (IPCC2003), and the guidelines for national GHG inventories (IPCC 2006) the simplest methodological approach consists of combining information on the extent of human activities (activity data or AD) with coefficients that quantify emissions or removals per unit activity (Emission Factors or EF)

#### **Emissions = AD x EF**

The information for input into the formulae is based on a three tier system. Tier 1 uses default data where EF data for the country is not available. Tier 2 uses similar methodological approach as tier 1 but applies EF and AD that are specific to a country for most important land use categories. In Tier 3 higher order methods are used including models and inventory measurement systems tailored to address national circumstances, repeated over time, and driven by high resolution activity data and disaggregated at the subnational to fine grid scales. Emission factors include biomass, carbon and carbon dioxide. Activity data include the activity which is an emission source and the area over which the activity is occurring.

### 3.4 UNFCCC, IPCC and REDD+

Dr. Julian Fox gave the presentation on the United Nations Framework Convention on Climate Change (UNFCCC). He stated that it was adopted as the basis for a global response to the climate change problem. Its ultimate objective is to stabilize GHGs concentrations in the atmosphere to a level that will prevent dangerous human interference with the climate system.

The intergovernmental panel on climate change (IPCC) is a scientific body which reviews and assesses the most recent scientific, technical and socioeconomic information produced worldwide relevant to the understanding of climate change. It does not conduct and research nor monitor climate related data or parameters.

The IPCC provides the guidelines and methodologies for calculating emissions. Methodologies should be consistent with the Revised 1996 IPCC Guidelines, IPCC Good Practice Guidance, 2003 IPCC Good Practice Guidance for LULUCF and 2006 IPCC Guidelines. National emission factors can be used, and can be integrated with default EFs (IPCC, CORINAIR, EPA and IPCC Emissions Factor Database (EFDB)) in the case where national data are not available.

Emissions from a given activity are expressed by the following general relation:

$$E_{s,a,t} = A_{a,t} * F_{s,a}$$

Where:

*E* = emission relating to substance "s" and activity "a" during time "t"

*A* = magnitude of activity "a" during time "t"

*F* = emission factor relating to substance "s" and to activity "a".

#### Recap of Previous Day's Concepts (REDD+, GHG and MRV) By Dr Julian Fox

At the start of day 3 sessions, Julian gave a preview of day two activities. This included the REDD+ concept, the science of climate change and forest carbon and an overview of GHG inventory and reporting format. Monitoring, MRV and GHG was reviewed in the context of UNFCCC, IPCC and REDD.

The key points noted were that:

- Historical reference emission levels need to be established through the compilation of historical Activity Data (AD), Emission Factors (EF) and annual historical GHG emissions over a reference period of 20 years. Therefore, accurate historical Activity Data is required
- The reference emission level is used as the reference point for future annual Activity Data (AD), and GHG reporting
- Accurate annual Activity Data is required to assess REDD+ performance, to estimate GHG emission reductions relative to the reference emission level
- Therefore accurate historical Activity Data, as well annual Activity Data reporting is required for REDD+ activities



### 3.4 IPCC Land Use, Land Use Change and Forestry Methodologies

Professor Yamba in this presentation elaborated on IPCC methodologies for preparing GHG inventories in the Land use, land use change and forestry (LULUCF) sector. These include:

- (i) Revised 1996 Guidelines for National Greenhouse Gas Inventories-Revised 1996 Guidelines,
- (ii) 2000 Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories-GPG 2000
- (iii) Good Practice Guidance for Land Use, Land-Use Change and Forestry-GPG LULUCF-2003,
- (iv) 2006 IPCC Guidelines for National Greenhouse Gas Inventories-2006 Guidelines

In this presentation, the methodologies for calculating emissions from land use, land use change and forestry were given alongside the methodology used to calculate emissions based on the 1996 IPCC revised guidelines. The priority calculations of emissions from land use and forestry focus upon the following activities:

- (i) Forest clearing and on-site burning
- (ii) Off-site burning (firewood and charcoal combustion)
- (iii) On-site biomass decay
- (iv) Carbon emissions from cultivation of organic soils
- (v) Carbon emissions from cultivation of mineral soils
- (vi) Carbon emissions from application of lime
- (vii) CO<sub>2</sub> and non CO<sub>2</sub> emissions (CH<sub>4</sub>, CO, N<sub>2</sub>O and NO<sub>x</sub>)

*(For details on the formulae refer to the training manual on Measurement, Reporting and Verification (MRV) and Green House Gas (GHG) Reporting to support REDD+ in Zambia, May 2012)*

A reporting format for national emissions was given. The format includes details on the categories that are sources of emissions or sinks against the GHGs emitted from the sources or sinks.

Reporting formats in various land use categories were also highlighted. These can be downloaded from the IPCC website. ([www.ipcc.ch](http://www.ipcc.ch))

The presenter explained on various land use categories, which included Land Use Change and Forestry (LUCF); Land Use, Land Use Change and Forestry (LULUCF). It was explained that the land uses given in the tables (in the Training Manual) are based on international definitions. However, the participants were encouraged to adopt and define the land uses based on the country specific conditions.

#### Introduction to Practical Exercise

An exercise was conducted in plenary by going through one of the tables of the reporting format that contained calculated and reported data to verify the formulae given earlier.

To conclude the presentation, Professor Yamba stated that Zambia has the option of using any of the guidelines provided by IPCC but that the best would be the 2006 guidelines as they incorporate and update the former guidelines.

#### 4.0 GROUP WORK ON CAPACITY ASSESSMENT FOR MRV AND GHG IN ZAMBIA

In order to assess the institutional capacity for MRV and GHG, identify the capacity gaps and develop an initial road map for MRV in Zambia, the participants were assigned to undertake group work. The five groups that were formed were broken up according to the technical requirements of an MRV and GHG reporting system for Zambia as follows:



Group work on Capacity Assessment

- Group 1: Discussed the Reference Emission Levels
- Group 2: Discussed Remote Sensing (Activity Data)
- Group 3: Discussed Forest Monitoring Using GIS (activity Data)
- Group 4: Discussed Forest Carbon Assessments (Emission Factors)
- Group 5: Discussed GHG Reporting

The exercise required the groups to:

1. Undertake an institutional capacity assessment for implementing the assigned activity in Zambia and discuss specifically the strengths and weaknesses of each institution for implementing the activity.
2. Identify capacity gaps in existing institutions and elaborate on capacity building requirements

#### 4.1 Presentation from Group 1 on Reference Emission Levels

The group was tasked to look at the following:

1. Undertake an institutional capacity assessment for implementing each activity in Zambia specifically the strengths and weaknesses of each institution for implementing the activity
2. Identify capacity gaps in existing institutions and elaborate on capacity building requirements.

#### **Background**

- Reference Emission Levels were formerly known as baseline emission levels.
- Zambia has Landsat data for several years and is in a position to use this to determine Reference Emission Levels. Land use classification with information already available can be done.
- Once this is done, a full MRV needs to be done every year and compared with Reference



Group 1 Brain Storming on Reference Emission Levels

Emission Levels. This is to be done in Phase 3 of REDD+ programme.

- Data is available to create land use maps from the years 1990, 1995, 2000, 2005 and 2010.

### ***Institutional Capacity***

The following institutions were identified as having the capacity to contribute to the exercise of creating Land use maps and hence coming up with Reference Emission Levels:

1. Survey Department (Ministry of Lands)
2. National Remote Sensing Centre
3. Lands Department
4. Forestry Department
5. Provincial Physical Planning Department
6. Ministry of Agriculture and Livestock- Land Husbandry Section/ Zambia Agricultural Research Institute
7. University of Zambia
8. Copperbelt University
9. National Heritage Conservation Commission
10. Central Statistical Office
11. City and Municipal Councils
12. Ministry Of Mines (This is one of the Institutions with rich historical data)
13. Zambia Wildlife Authority
14. Consultants and Private Institutions

### **N/B**

- Security wings have data
- Historical maps are also important to inform construction of Reference Emission Levels.
- Community and other stakeholder involvement is critical in ground truthing.

### ***LIST OF INSTITUTIONS FOR REMOTE SENSING ANALYSIS/GROUND TRUTHING AT PROVINCIAL AND DISTRICT LEVELS***

<b>SER. NO.</b>	<b>REMOTE SENSING ANALYSIS</b>	<b>GROUND TRUTHING (PROVINCIAL/ DISTRICT LEVEL SUITED FOR THIS)</b>
1*	Survey Department	Survey Department
2*	National Remote Sensing Centre	Forestry Department
3*	Lands Department	Provincial Physical Planning Department
4*	Forestry Department	Agriculture- Land Husbandry Section
5	University of Zambia	Zambia Wildlife Authority
6	Copperbelt University	Central Statistical Office
7	National Heritage Conservation Commission	City and Municipal Councils
8	Zambia Wildlife Authority	
9	Ministry of Mines	
10	Consultants and other private companies	

\*Highlighted Institutions are the Key institutions

## NOTES

- Political Will is very important for the success of the exercise. As such, the final decision on the country's Reference Emission Levels needs to rest with a high office. Cabinet approval is important.
- Emission Factors and other factors need to be incorporated in order to come up with the final Reference Emissions for the country.
- There is also need for more research on different emissions from the different vegetation.

### **STRENGTHS AND WEAKNESSES OF KEY INSTITUTIONS**

The following were the general weaknesses identified to be in all the Institutions:

- Inadequate capacity in analysis hence the need for capacity building in this area.
- Inadequate human resource.
- Insufficient logistics e.g. transport, camping equipment etc.

No.	Institution	Strengths	Weaknesses
1.	Lands and Survey Departments	<ul style="list-style-type: none"> <li>• They have the equipment</li> <li>• Trained and skilled manpower</li> <li>• Availability of materials e.g. land use and topographic maps, and aerial photographs.</li> </ul>	<ul style="list-style-type: none"> <li>• Inadequate staffing especially at provincial level.</li> <li>• No structure at district level.</li> <li>• Inadequate capacity in Reference Emission Levels.</li> <li>• Inadequate funding</li> <li>• Semi- commercial institution</li> </ul>
2.	National Remote Sensing Centre	<ul style="list-style-type: none"> <li>• Available equipment</li> <li>• Available skills</li> <li>• Ability to generate historical mapping data</li> </ul>	<ul style="list-style-type: none"> <li>• Inadequate staffing.</li> <li>• No structures at provincial and district levels.</li> <li>• Inadequate capacity in Reference Emission Levels.</li> <li>• Inadequate funding</li> <li>• Commercial institution</li> </ul>
3.	Forestry Department	<ul style="list-style-type: none"> <li>• Presence of structures at provincial and district levels.</li> <li>• Availability of GIS equipment at provincial level.</li> <li>• Trained man power.</li> <li>• Housing REDD+ Programme.</li> </ul>	<ul style="list-style-type: none"> <li>• Inadequate funding.</li> <li>• Inadequate logistics e.g. vehicles.</li> <li>• Inadequate man power.</li> </ul>

4.	Provincial Physical Planning Department	<ul style="list-style-type: none"> <li>•Availability of equipment for mapping and remote sensing.</li> <li>•Skilled manpower.</li> </ul>	<ul style="list-style-type: none"> <li>•No presence at district level. Inadequate funding.</li> <li>•Inadequate logistics e.g. vehicles.</li> <li>•Inadequate man power.</li> </ul>
5.	Agriculture- Land Husbandry Section	<ul style="list-style-type: none"> <li>•Presence at provincial, district and camp levels.</li> <li>•Priority ministry i.e. increased funding</li> <li>•Decentralised funding</li> <li>•Presence of GIS Unit.</li> </ul>	<ul style="list-style-type: none"> <li>•Inadequate skills in relation to GIS and Reference Emission Levels.</li> <li>•Inadequate funding and logistics especially at camp levels.</li> </ul>

#### 4.1.1. Plenary Discussion on the Presentation

It was observed that the capacity gaps were not assessed by the group and therefore they needed to complete their task. An argument was given that the weaknesses could still be converted to capacity building requirements, as currently Zambia has limited capacity to establish Reference Emission Levels. Capacity needs to be strengthened before the country is able to handle analysis of GHG emissions and Reference Emission Levels.

It was concluded that Reference Emission Levels have never been done in Zambia and will need a lot of capacity strengthening.

#### 4.2 Presentation from Group 2 on Remote Sensing (Activity Data)

Headed by Mr. S Maango

##### Group Members

Mr. J.Cheelo  
Mrs. K.Kanjipite  
Mr. S.Musosa  
Mr. Nyirongo  
Mr. A.Chanda  
Ms. B.Daura  
Mr. J .Tonga  
Mr. Keddy Mbindo  
Mr. K. Seke



Group 2 Strategizing on Remote Sensing

##### Introduction

Remote Sensing (RS) is a science of collecting satellite pictures about our environment. GIS is an analysis tool which depends on the satellite pictures.

## **History of Remote Sensing**

RS emanated from the military sector, where they used to tie a camera to a pigeon and get information about the enemy territories.

By 1972 NASA developed a Landsat satellite system that had been 'photographing' the world in stripes.

The Landsat images are in time series ranging from 1972 to 2010. They are currently available for free downloads.

Sensors in landsat satellite 'see' beyond our human visual region, such as ultra violet, infrared and many more, called bands, which are useful for interpretation of our environment.

## **Use of RS in Forestry MGT**

- Able to generate distances, areas and overview of forestry cover before going in the field.
- Different bands can be used to derive different land use. For instance, bands 3 and 4 are used to discriminate vegetation from other land use, important for forestry monitoring.

## **Merits**

- Gives an overview of the forest cover to aid planning and decision making
- Aids quantify the stocking levels from digitized images
- Depicts the status of plantation to answer some management questions even before going in the field. For instance, this has already been demonstrated in Mansa, Kasama and Chinsali in some of the Forest reserves using Google images and the installed Arc GIS10.
- It cuts out on the field expenses.
- Helps in comparisons of the land use changes over time.
- The data series in RS images help in establishing forest cover change predictions, just in the office.

## **Observed Requirements in Remote Sensing For Forest Management in Zambia**

- We have historic satellite images but we need near real time-series satellite images using other advanced technologies.
- Unlike Google images, we need to use original satellite images for proper scientific analysis.
- Need to have a facility to download the images as a country for particular time series as required to enhance Forest Monitoring systems.

## **Capacity Building (Skills/Manpower) in Remote Sensing**

- Basic equipment (1 computer /province) has been made available but is not adequate.
- Need for equipment and human capacity at district level.
- Need for re-training based on the software version provided (ArcGIS 10)
- Invest in long term training at national and provincial level to have dedicated personnel in GIS/RS
- Introduce remote sensing units at both national and provincial level

## Institutions Available

Institutions are available at national level to carry out research and training

- National Remote Sensing Center
- UNZA
- Ministry Lands
- Ministry Mines
- ZEMA
- SCGIS

## Gaps

- Technical issues such as updating and downloading land sat images on a reliable shortest possible time series.
- Inadequate man power in institutions to coordinate RS activities.
- Gaps in data sharing among institutions
- Lack field data collection equipment (GPS, etc.)

### 4.2.1 Plenary Discussion on the Presentation

There was consensus that the presentation reflected the situation on the ground and that all the tasks for the work had been addressed. A proposal was made to add Society for Conservation GIS (SCGIS) as a key partner in Remote Sensing in Zambia.

## 4.3 Presentation from Group 3 on Forest Monitoring Using GIS

### KEY INSTITUTIONS IN FOREST MONITORING USING GIS (ACTIVITY DATA)

- Forestry Department
- Lands Department
- Survey Department
- Higher Learning Institutions
- National Remote Sensing Centre
- ZEMA
- Agriculture
- Local Government
- Department of Physical Planning
- Department of Resettlement
- ZAWA
- CSO
- National Heritage
- Water and Energy Department
- Traditional Authority
- Mines Department



The Forest Monitoring Group (Activity Data)

## **INSTITUTIONAL STRENGTHS AND WEAKNESSES**

### ***Key Institutions***

- Forestry Department
- Survey Department
- Agriculture Department
- National Remote Sensing Centre

## **FORESTRY DEPARTMENT**

### ***Strengths***

- Abundance of Forests
- Wide spread
- Trained and Skilled Human Resource
- Availability of Information
- Presence of GIS tools

### ***Weaknesses***

- Inadequate Funding
- Inadequate Staffing
- Inadequate Transport
- Poor Infrastructure
- Inadequate capacity to use GIS tools
- Inadequate GIS tools
- Law and Policy conflicting
- Lack of internet facilities
- Lack of data base and information Management System

## **SURVEY DEPARTMENT**

### ***Strengths***

- Availability of spatial data e.g. Maps
- Skilled Human Resource
- Availability of GIS tools

### ***Weaknesses***

- Lack of up dated Maps
- Centralized management system
- Lack of information storage system

## **NATIONAL REMOTE SENSING CENTRE**

### ***Strengths***

- Availability of Remote Sensing data
- Skilled Human Resource



### **Weaknesses**

- Highly Centralized and expensive to access
- Inadequate man power

## **AGRICULTURE DEPARTMENT**

### **Strengths**

- Trained and Skilled Human Resource
- Adequate Funded
- Adequate Transport
- Decentralized operations
- Well-staffed

### **Weaknesses**

Inadequate GIS/GPS equipment

### **Gaps**

- No data sharing mechanisms among stakeholders
- Out dated legislation to govern implementation
- Inadequate staffing in Forestry Department
- Centralized funding systems for Forestry Dept.
- Inadequate Political Will
- Uncoordinated planning at all levels
- Lack of coordination in planning and budgeting
- Inadequate skills in GIS and Remote Sensing
- Inadequate interface between the depts. and the communities
- Inadequate spatial data
- Lack of existing strategies for sustainable projects
- Capacity Building Requirements
- Further decentralization of management from provincial to districts
- Intensive trainings win forest monitoring using GIS
- Procurement of more GIS tools and forest mensuration equipment
- Training in information management
- Sensitization and strengthening of local structures
- Increased funding
- Need to update forest maps
- Development of forest management plans

#### **4.3.1 Plenary Discussion on the Presentation**

Some participants felt that the presentation was too generalised and did not zero in on the weaknesses and strengths of the institutions in relation to forest monitoring using GIS. Other participants felt the presentation was well presented and its elaborateness was necessary for Forestry Department to begin to act in the right direction.

It was noted that political will is there to change the department and that the Minister of Lands, Natural Resources and Environmental Protection is working towards the formulation of a communication strategy to address the problems in the department.

#### 4.4 Presentation from Group 4 on Forest Carbon Assessment (Emission Factors)

##### FOREST CARBON ASSESSMENT (EMISSION FACTORS)

Institutions	Institutional Roles	Strengths	Weaknesses	Recommendations
Forestry Department	<ul style="list-style-type: none"> <li>Biomass Assessment</li> <li>Area Measurement</li> <li>Data Processing</li> <li>Information on total tradition fuel wood consumed</li> <li>Commercial harvest of timber</li> </ul>	<p>Wide spread presence around the country</p> <p>Already existing structure</p> <p>Availability of Human Resource</p>	<ul style="list-style-type: none"> <li>Inadequate tools &amp; equipment</li> <li>Understaffing</li> <li>Inadequate technical expertise in forest carbon assessment</li> <li>Lack of laboratory and field equipment</li> <li>Lack of appropriate hard &amp; software for data capture, analysis and presentation</li> </ul>	<ul style="list-style-type: none"> <li>Provision</li> <li>Recruitment</li> <li>Specialised Training</li> <li>Provision</li> <li>Provision</li> </ul>
Agriculture Department	<ul style="list-style-type: none"> <li>Soil carbon Assessment</li> </ul>	Have ready expertise in carbon assessment	<ul style="list-style-type: none"> <li>Lack of institutional coordination</li> <li>inadequate laboratory and field equipment</li> </ul>	<ul style="list-style-type: none"> <li>Harmonisation</li> <li>Provision</li> </ul>
Geological Survey Department	<ul style="list-style-type: none"> <li>Area Measurement</li> </ul>	<p>Have ready expertise in carbon assessment</p> <p>Have already existing strong analytical equipment</p>	<ul style="list-style-type: none"> <li>Centralised System</li> </ul>	<ul style="list-style-type: none"> <li>Inter-institutional Corporation/Collaboration</li> </ul>
Research Institutions (ZARI, Forestry Research)	<ul style="list-style-type: none"> <li>Assess Carbon Fraction of Dry Matter</li> <li>Soil carbon Assessment</li> </ul>	<ul style="list-style-type: none"> <li>Have ready expertise in carbon assessment</li> <li>Already existing structure</li> </ul>	<ul style="list-style-type: none"> <li>Old &amp; dilapidated equipment</li> </ul>	<ul style="list-style-type: none"> <li>Acquire New &amp; updated equipment</li> </ul>
Local Government (Town & Country Planning Unit)	<ul style="list-style-type: none"> <li>Land authorities</li> <li>Area measurement</li> </ul>	<ul style="list-style-type: none"> <li>Already existing structure</li> <li>Have authority over land</li> </ul>	<ul style="list-style-type: none"> <li>Poor collaboration with other public institutions</li> </ul>	<ul style="list-style-type: none"> <li>Enhance collaboration</li> </ul>
Central Statistical Office (CSO)	<ul style="list-style-type: none"> <li>Area measurement</li> <li>Information on total tradition fuel wood consumption</li> </ul>	Conduct surveys through National Census	<ul style="list-style-type: none"> <li>Poor collaboration with other public institutions</li> </ul>	<ul style="list-style-type: none"> <li>Enhance collaboration</li> </ul>
Department of Energy	<ul style="list-style-type: none"> <li>Information on total tradition fuel wood consumed</li> </ul>	<ul style="list-style-type: none"> <li>Already existing structure</li> </ul>	<ul style="list-style-type: none"> <li>Centralised System</li> </ul>	<ul style="list-style-type: none"> <li>Inter-institutional Corporation/Collaboration</li> </ul>
Private Sector e.g. Alfred Knight	<ul style="list-style-type: none"> <li>Assess Carbon Fraction of Dry Matter</li> <li>Information on total tradition fuel wood consumed</li> </ul>	<ul style="list-style-type: none"> <li>Stringent Quality Control</li> <li>Not too bureaucratic</li> </ul>	<ul style="list-style-type: none"> <li>Not very willing to provide free information</li> </ul>	<ul style="list-style-type: none"> <li>Need to identify a way of bringing them on board</li> </ul>

Mines & Minerals	<ul style="list-style-type: none"> <li>• Being Evaluated</li> </ul>			
Remote Sensing	<ul style="list-style-type: none"> <li>• Being Evaluated</li> </ul>			
NGOs (Celim)	<ul style="list-style-type: none"> <li>• Forestry Management Enhancement</li> </ul>	<ul style="list-style-type: none"> <li>• Constantly in touch with the people on the ground</li> </ul>	<ul style="list-style-type: none"> <li>• Uncertainty with Sustainability</li> </ul>	<ul style="list-style-type: none"> <li>• Draw up memorandum of understanding for collaboration with government</li> </ul>
Academia (Private & Government e.g. Copperbelt University, UNZA)	<ul style="list-style-type: none"> <li>• Carbon Fraction of Dry Matter</li> <li>• Commercial harvest of timber</li> <li>• Biomass Assessment</li> </ul>	<ul style="list-style-type: none"> <li>• Human Development</li> <li>• UNZA has a laboratory and research facilities already in place</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of proper laboratory equipment (CBU)</li> </ul>	<ul style="list-style-type: none"> <li>• Provision</li> </ul>
ZEMA	<ul style="list-style-type: none"> <li>• Pollution Monitoring</li> </ul>	<ul style="list-style-type: none"> <li>• Expertise in environmental management</li> <li>• Regulatory body for environmental issues</li> <li>• Equipment to assess levels of pollution</li> </ul>	<ul style="list-style-type: none"> <li>• Centralised System</li> </ul>	Inter-institutional Corporation/Collaboration

#### 4.4.1 Plenary Discussion on the Presentation

From the presentation, it was noted that some NGOs can be very useful in the MRV process and therefore there is a need for such NGOs to be incorporated in the process. An example given was CeLIM an Italian NGO operating in Mongu. CeLIM are working in Mongu to address some aspects of forestry management and forest conservations as well monitoring deforestation using GIS.



*Mr. Sesela Presenting on behalf of the Group*

#### 4.5 Presentation from Group 5 on GHG Reporting

##### Names of Group Members

- 1) Muyunda Kingsley
- 2) Davies Kashole
- 3) Odila Chilekwa
- 4) Patrick Mulenga
- 5) Peter Petulo
- 6) Prof F.D Yamba
- 7) Champo Lasford
- 8) Ernest Kunda
- 9) Louis J Musonda
- 10) Francis Mwila



*Group 5 Conversing on GHG Reporting*

11) Mushitin I Harrison

**Discussion framework for GHG reporting**

GHG SECTOR AFOLU	POSSIBLE STAKEHOLDERS	STRENGTHS	WEAKNESS
	ZEMA	i) Coordinator for National Communications ii) Enabling policy in place to undertake GHG	Inadequate capacity to do GHG reporting
	ZARI	i) Provision and improvement of activity data and emission factor ii) Has presence at provincial level iii) Adequate scientific human resource	Inadequate financial resources for research
	University of Zambia	i) Provision and improvement of activity data and emission factor iii) Adequate scientific human resource	i) Inadequate financial resources for research ii) Country presence limited
	Forestry Department	i) Knowledge base is there for generation of activity data and Emission factors ii) Mandate to manage and protect forestry resources	i) Inadequate policy and legislation ii) inadequate oriented staff in GHG reporting iii) Inadequate transport and equipment to collect data to feed into GHG reporting
	Copper-Belt University	i) Provision and improvement of activity data and emission factor iii) Adequate scientific human resource	i) Inadequate financial resources for research ii) Country presence limited
	MALVF	i) Provision and improvement of activity data ii) Has presence up to sub district level	i) Inadequate formalized QA/QC for GHG reporting ii) inadequate financial resources for GHG reporting
	GART	i) Provision and improvement of activity data and emission factor ii) Has presence at provincial level iii) Adequate scientific human resource iii) conservation farming technologies	i) Inadequate financial resources for research ii) Country presence limited
	ZAFFICO	i) Provision and improvement of activity data and emission factor	i) Country presence limited
	Department of Energy	i) Provision and improvement of activity data	Country presence limited
	NGO Research - Center for Energy Environment Engineering	i) Engaged in the Initial and draft second National communications ii) Expertise and knowledge for GHG reporting iii) Coordination of ESA GHG project for AFOLU sector	i) lacking financial resources
	Central Statistical Office	i) Capacity of collecting activity data.	i) lacking financial resources

**4.5.1 Plenary Discussion on the Presentation**

It was observed that the capacity gaps were not assessed by the group and therefore they needed to complete their task. An argument was given that the weaknesses could still be converted to capacity building requirements.

It was suggested that Central Statistical Office should be taken on board in the MRV process so that their data and information package could include aspects of MRV data.



*Group 5 presenting the framework for GHG reporting*

## DAY 4

A recap was done on the previous day's presentations and group work. It was agreed that the groups that had not completed their tasks should do so in addition to the second group exercise.

### 5.0 GROUP WORK ON MRV ROAD MAP

The exercise required that the participants in the groups formulated earlier, map out a possible implementation pathway for their assigned activities, identifying the needs and capacities that needed to be strengthened in order to achieve implementation.

The groups should further show how other activities contribute to achieving implementation of MRV and identifying their interdependencies between activities (Reference emission levels, Remote Sensing, Forest Monitoring using GIS, Forest Carbon Assessments and GHG Reporting).

### 5.1 Group Presentations on MRV Road Map

#### 5.1.1 Group Exercise: Reference Emission Levels (Group 1)

##### Development of Roadmap

1. In the first instance there is a need to bring together the identified stakeholders and explain the technicalities of Reference Emission Levels. From this there is a need to setup (or use an existing) technical committee from these major stakeholders.
2. **Structure for implementation**
  - Technical steering committee
  - Technical work undertaken by specialised institution
  - Ground verification
  - Cabinet approval of Zambia Reference Emission Level



Question and Answer Session for Group 1

### 5.2 Group 2: Remote Sensing

#### **GAPS**

- Technical issues such as updating and downloading land sat images on a reliable shortest possible time series.
- Inadequate man power in institutions to coordinate RS activities.
- Gaps in data sharing among institutions
- Lack of field data collection equipment (GPS, etc.)
- Need to update Forest inventories (status of forests), as one of the baseline data for MRV
- Lack of transport at district level, for field data collection

## **ROAD MAP TO EFFECTIVE MRV**

### **1. Capacity building for road map (activities)**

- Need for purchasing necessary equipment such as GPS at provincial and district levels. The research office should also be equipped with MRV equipment (GIS, GPS)
- Need to have refresher courses at provincial level, ranging from 1-2 weeks.
- Strategies on follow up training visits, for instance 2 days in a month/province
- Practice more on the use of the just installed equipment (GIS software)
- If we are to adopt the Terra Amazon system there is need to have networked terminals
- Need to purchase networked licenses within offices and interlink all the provinces, including the research office.
- Increase on the number of single use ArcGIS licenses and computer terminals in the provinces
- Need to have fulltime dedicated staff to do the GIS/RS (MRV) works.

### **2. COLLABORATING PARTINERS**

#### **National Remote Sensing Center**

- Remote Sensing Center which has core mandate to equip institutions in GIS and Remote Sensing technology
- They have sufficient GIS/RS information
- Have sufficient equipment which they have continued to accumulate
- Have sufficient Data storage facilities (computers) and referrals
- Establishing Ground Receiving Station (10 years?)

#### **SURVEY DEPARTMENT**

- They are reference institution, upon which all mapping activities (GIS/RS) are anchored on. MRV will use GIS/RS as one of the tools.

#### **MINISTRY OF MINES**

- Presents potential conflicts through issuance of mining rights, which mostly affect forest management issues. Hence the need for collaboration on operation/legal modes.

#### **UNIVERSITY OF ZAMBIA**

- They provide training in basic remote sensing and GIS (tools for MRV).

#### **ZEMA**

- Provide State of Environment Reports, which are possible data source for MRV.

#### **FORESTRY DEPT AT DISTRICT LEVEL**

- Provide ground data on the current status of forest resources.
- To digitize the forest boundaries and vegetation cover status, as part of MRV

#### **SCGIS**

- As partners of ESRI, they are possible source of ArcGIS software at concession prices. ArcGIS is the main software installed towards MRV activities.

## MINISTRY OF AGRICULTURE

Possible operational partners in provision of some resources (transport) currently lacking in the Forestry Department district level. This is a short term measure to cater for transport needs required for data collection (MRV input).

### 5.2.1 Plenary Discussion on Remote Sensing Presentation

- An observation was made that the group did not fully understand part two of the assignment which was to show how the Remote Sensing component relates to the other four key components of MRV and their interdependencies.
- It was agreed that Forestry Department as a lead institution in collecting information that will complement remotely sensed data will depend largely on other equally key sectors such as Agriculture for transport before the core department is able to procure its own transport. Therefore the need to come up with a Memorandum of Understanding (MoU) between the two Ministries for this to be effective.
- It was learnt that National Remote Sensing Centre has been funded to procure high resolution images. They will be a source for sharing satellite images for use in remote sensing. Therefore this institution will offer free satellite imagery in about 10 years' time which clients will download for their use.
- The Chief Extension Officer (FD) intimated that transport inadequacies should not deter the process and that the department is committed to procure vehicles and that through capitalisation the operations of the department will improve.

### 5.3 Group 3: Forest Monitoring Using GIS (Activity Data)

#### Road map implementation of Forest Monitoring Using GIS Activity

Gaps	Activity	Capacity need	Institutions
Lack of Data sharing mechanisms among stakeholders	Strengthening of the environmental subcommittees of the DDCC	Training in data storage and information system management	Forestry, Agriculture, local Authority
	Establish environmental subcommittees in places where there are non-existence	Training in data storage and information system management	Forestry, Agriculture, local Authority
	Establishment of data base at Forestry Department Provincial offices	-Training in data collection and management -Data sharing policy and legislation -Training in internet accessing	Forestry, Agriculture, Survey
	Improve the Forestry Department website for information dissemination	-Training in website design and update	

Inadequate skills and knowledge in GIS and Remote Sensing	Hands on training and application of GIS to various aspects of forestry management	-Training in GIS tools and equipment (Terramazon software)	Forestry, Agriculture, Survey
Inadequate spatial data	Forestry inventory for ground truthing Acquisition of spatial data Updating of outdated maps	-Procurement of inventory equipment and tools -Data storage devices- hardware and software.	Forestry, Agriculture, Survey
Centralized operation systems for Forestry Dept.	Decentralized operations	-Establishment of accounting units at district level -Orientation in financial management systems -Procurement of office equipment -Transport -Installation of internet facilities at district level	Forestry

1. GIS will depend on inputs from remote sensed data
2. Open Source Software (OSS) does not provide a solution for every computing requirement, nor always an optimal solution, but it is a well-established part of the computing ecosystem; playing critical roles in Internet and business infrastructures.

### **5.3.1 Plenary Discussion on Presentation**

The participants expressed concern on the use of Open Source Software for forest monitoring. The experience is that such software has got limitations that prevent full use and analysis of data. Some participants feared that if we are all encouraged to download these free software, we may end up with differently analysed data that will compromise uniformity and quality of information. The participants said it is important for Zambia to acquire licensed software for completeness of results.

Dr Fox advised that the licensed software is expensive and that it may not be possible to acquire these. He stated that accordingly, FAO and the Brazilian Space Agency (INPE) have forged a partnership to support UN-REDD countries to develop their own forestry monitoring systems based on the Open Source Software TerraAmazon.



## 5.4 Group 4: Forest Carbon Assessment (Emission Factor)

### ROAD MAP FOR FOREST CARBON ASSESSMENT (EMISSION FACTORS)

#### Group members

1. Sesele
2. Namonje
3. Nyirenda
4. Hara
5. Ing'utu
6. Mwangala
7. Kaumba
8. Kunda
9. Gambwe



*Group 4 during a plenary Session*

### MEASUREMENT, REPORTING AND VERIFICATION [MRV]

Institutions	Institutional Roles	Needs	Capacity Strengthening	Strategy for Implementation
Forestry and Agriculture Department	<ul style="list-style-type: none"> <li>• Biomass Assessment</li> <li>• Area Measurement</li> <li>• Data Processing</li> <li>• Information on total tradition fuel wood consumed</li> <li>• Commercial harvest of timber</li> <li>• Soil carbon Assessment</li> <li>• Information on total tradition fuel wood consumption</li> </ul>	<ul style="list-style-type: none"> <li>• Tools &amp; equipment</li> <li>• Staffing improvement</li> <li>• Technical expertise in forest carbon assessment</li> <li>• Laboratory and field equipment</li> <li>• Appropriate hard &amp; software for data capture, analysis and presentation</li> <li>• Coordination</li> <li>• Climate Change Policy to address Carbon issues</li> </ul>	<ul style="list-style-type: none"> <li>• Provision of tools and equipment</li> <li>• Recruitment of Staff</li> <li>• Specialised Training</li> <li>• Upgrading and procurement of laboratory facilities</li> <li>• Provision of hard and software for data collection, analysis and presentation</li> <li>• Mutual agreement [MOU]</li> <li>• Communication</li> <li>• Focused and addressed to carbon assessments</li> </ul>	<ul style="list-style-type: none"> <li>• Budgets, Sourcing funds from donors/government and procurement</li> <li>• Recruitment of Staff</li> <li>• Identify and implement short and long term courses in relation to carbon assessment</li> <li>• Procure modern laboratory facilities and where possible construct new laboratories</li> <li>• Intranet communication, information sharing, reports and website establishment</li> <li>• Advocacy for appropriate legal frame work</li> </ul>
Zambia Survey	<ul style="list-style-type: none"> <li>• Area Measurement</li> </ul>	<ul style="list-style-type: none"> <li>• Decentralised System</li> </ul>	<ul style="list-style-type: none"> <li>• Inter-institutional</li> </ul>	<ul style="list-style-type: none"> <li>• Identify and</li> </ul>

Department, Research Institutions, Academia, CSO, ZEMA and Energy Department	<ul style="list-style-type: none"> <li>• Soil carbon Assessment</li> <li>• Assess Carbon Fraction of Dry Matter</li> <li>• Reporting on GHG</li> <li>• Information on total tradition fuel wood consumption</li> </ul>	<ul style="list-style-type: none"> <li>• Tools and equipment</li> <li>• Improved accessibility</li> <li>• Upgrade and update data bases</li> <li>• Orientation in Carbon assessment MRV</li> </ul>	<ul style="list-style-type: none"> <li>• Corporation/Collaboration</li> <li>• Specialised Training</li> </ul>	implement short courses and workshops in relation to carbon assessment
Local government, Local Communities, NGOs and Private Sectors	<ul style="list-style-type: none"> <li>• Participation in inventory</li> <li>• Land authorities</li> <li>• Area measurement</li> </ul>	<ul style="list-style-type: none"> <li>• Technical knowledge</li> <li>• Collaboration</li> </ul>	<ul style="list-style-type: none"> <li>• Acquire New &amp; updated equipment</li> <li>• Enhance collaboration i.e. they should not be by passed</li> <li>• Orientation, training &amp; Sensitization</li> </ul>	<ul style="list-style-type: none"> <li>• Joint workshops, meetings &amp; trainings</li> <li>• Provide them with roles to play in implementation</li> </ul>

## OTHER ACTIVITIES CONTRIBUTING TO CARBON ASSESSMENT

- GIS, GPS, RS Technologies utilisation/applications in Forest Carbon Assessment
- Establishment of information data bases and intra-connectivity
- Climate Change Policy and legal framework in M, MRV and GHG

### 5.4.1 Plenary Discussion on Presentation

A suggestion was made that National Institute for Scientific and Industrial Research (NISIR) be added as a key institution in forest carbon assessment.

It was observed that in all the presentations, timelines and action points are not clearly coming out. However, Dr. Fox noted that within the time frame of the workshop, it has not been possible to do so but that there have been enough actions brainstormed to provide a working document for formulating a roadmap. This will be done by a select committee and the information will be shared with everyone.

## 5.5 Group 5. GHG Reporting

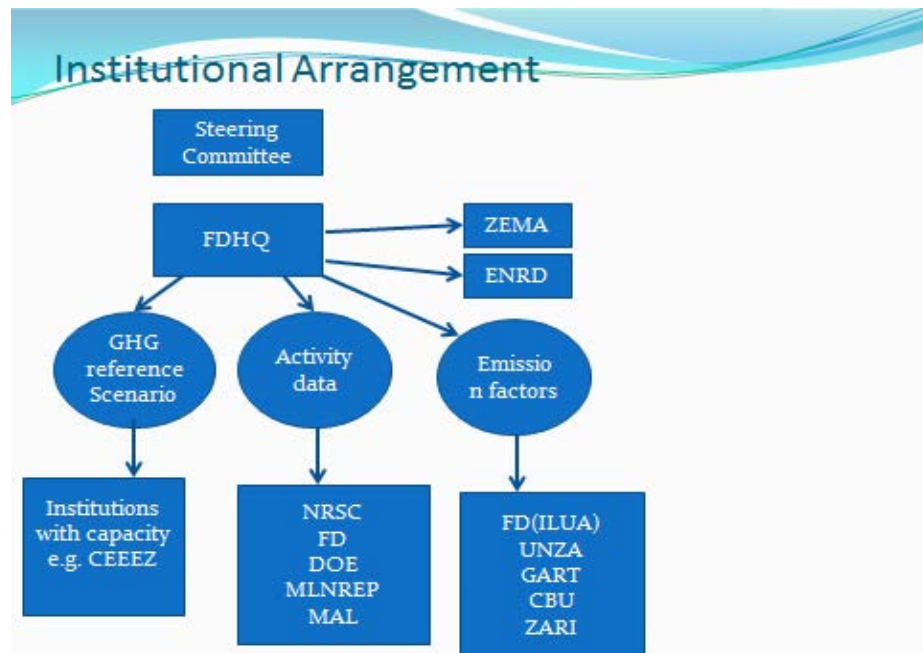
### Steps to implementation pathways for MRV Road map for GHG reporting

- Formalization institutional arrangements for MRV system for GHG reporting
- Undertake actual work through learning by doing:
  - a) Activity data preparations
  - b) Emission factor preparations
  - c) GHG and reference scenarios
- Develop Reference Scenario
- Mitigation potential

- Development of bankable proposals
- Project identification
- National strategy
- Implementation of MRV system

### 5.5.1 Plenary Discussion on Presentation

There was a heated debate on how to incorporate the NGOs to actively participate and be part of the road map to realise the objectives of REDD+ in Zambia.



It was finally agreed that NGOs with capacity to deliver should be identified and incorporated as partners in development not only the government/parastatal bodies.

### CAPACITY NEEDS FOR MRV SYSTEM

- Tools, material, equipment's and methods
- Widening the scope of capacity building at provincial level which has been addressed by the other groups.
- Undertake short term studies to improve activity data and Emission factors.

### 6.0 GHG REPORTING WORKING GROUP 1 AND 2

As a way forward, Professor Yamba emphasized the need to be focused from now on, and that GHG reporting is very vital to help move REDD+ programme forward. Therefore all the tasks in the future should be done with a purpose. He introduced the GHG working group hand outs for use in the future during the collection of Activity Data and Emission Factors.

To develop a robust and transparent GHG inventory, biomass data for Emission Factors is needed and can only be collected by the people on the ground. In addition, the following information will be necessary:

- Land use classification such as grassland, cropland, and defining them
- Management systems definition in order to come up with GHG emission levels
- Information on ages of perennial trees
- Land management practices
- Settlements (Because they contribute to deforestation)

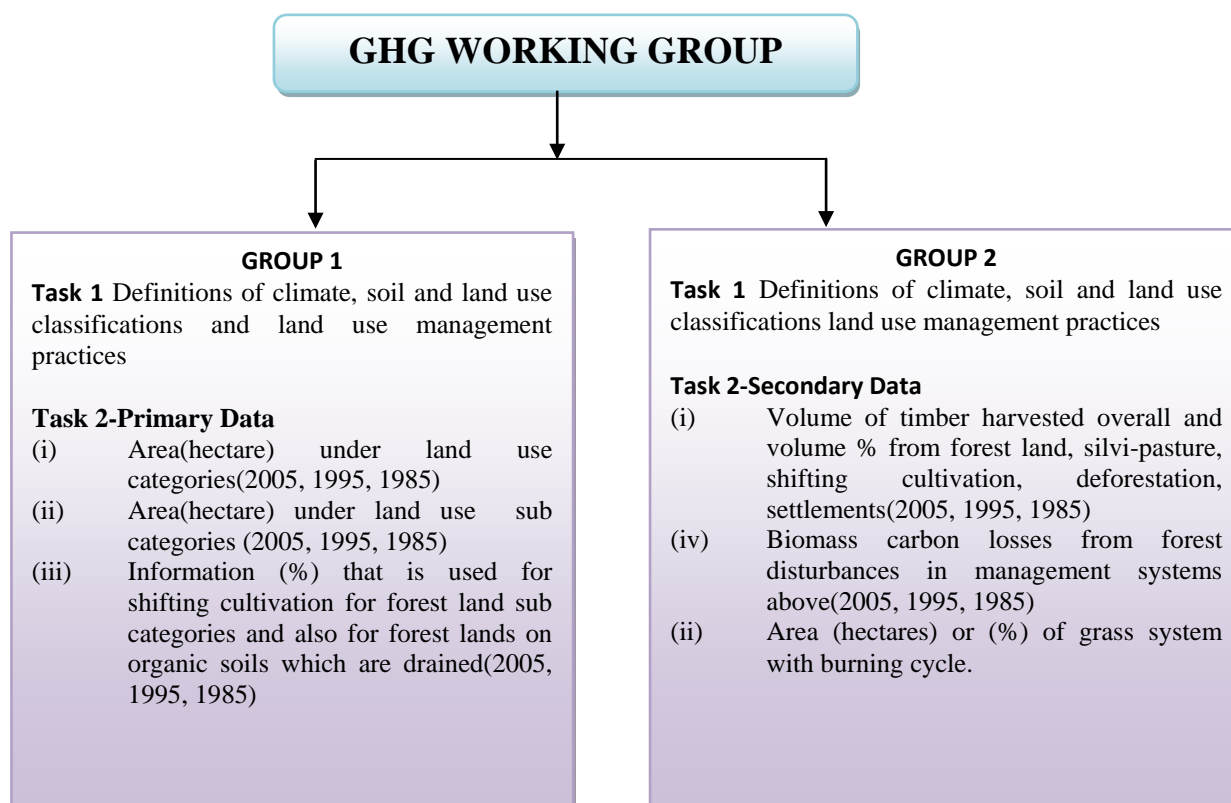
It is also important to know and understand the drivers of deforestation.

He stated that “all the group work presentations should be synergised and come up with an implementation plan which should eventually lead to MRV for REDD+”

He gave a presentation on **GHG REPORTING GROUP WORK-I with an OBJECTIVE** to enable development of a robust and transparent GHG inventory for land use, land use change and forestry. The group work required definition of climate, and soils, and land use classification, followed by activity data generation. The objectives of the Group Work are; (i) define climate, soil and land use classifications, (ii) define land use management systems, (iii) make recommendations on status of primary and secondary data availability and gaps

### ARRANGMENT OF GROUP WORK AND TASKS

Two groups are being suggested to consider cross cutting issues (i) and (ii) above and then each group will then make recommendations for primary data and secondary availability and gaps, respectively.



## 7.0 BRIEF PRESENTATION ON TERRA AMAZON BY KEDDY AND SAMUEL

The implementation of REDD+ will require advanced ways of monitoring forests, forest carbon stocks and adequate measurement, reporting and verification (MRV) capacity. In order to achieve this as a country, we have to develop large scale monitoring capacity that will help provide accurate and transparent data to the public. To develop strong nationally-owned forest monitoring systems, technical and institutional capacity building will be required. Currently, our monitoring systems are not adequate enough for the MRV of forest carbon stocks required for REDD+ implementation. For this reason, we are exploring how to design and implement an advanced forest monitoring system in a cost-efficient way. TERRA AMAZON is one forest data processing and monitoring system option that we are currently studying and evaluating for possible adoption in advancing our forest monitoring in Zambia.

TERRA, a word from Latin word meaning, “solid earth or dry land”. AMAZON derived from Amazon forest, the world’s largest tropical rain forest and river basin.

TerraAmazon is a GIS tool designed to be a multi-user editor of geographic vector data stored in a TerraLib model database. It engages land use and land cover classification tools as well as spatial operations between vector data, allowing transitions analysis among other applications. TerraAmazon is part of Brazil’s attempt to become an international reference on forest monitoring programmes. Developed by the National Institute for Space Research (INPE) in Brazil for it’s forest monitoring programs. TerraAmazon is available free of charge to any country interested in monitoring their own forests. Through INPE, Brazil currently monitors by satellite 4 million square kilometres of Amazon rainforest every year which they have been doing for over 20 years now. The world’s biggest forest monitoring program allows Brazil to measure deforestation and to release all information from satellites.

Terra Amazon can perform the following functions:

- Allows assisted interpretation of multi-temporal imagery from multiple sensors, on a corporate, distributed and concurrent environment, aiming at the production of maps
- Within continental scales, a deforestation map and deforestation rates are produced annually and disseminated over the internet.

### ***What Brazil is doing by Using Terra Amazon***

INPE in Belém Brazil is responsible for developing forest monitoring systems using TerraAmazon as the Brazilian software platform to support the estimation of the annual rate of deforestation (PRODES), the detection of forest degradation (DEGRAD), selective logging activities (DETEX) and the “near-real time” monitoring of the forest cover in support of more effective forest control and enforcement activities (DETER

### **Pros and Cons of TerraAmazon**

- Good for team work and hence networked project management
- Instant control during image interpretation and hence quality control
- A motivation to own software customization for a particular situation

- Available for free download

#### Cons

- Software still under development, hence some technical hitches
- Attribute tables not generated, a great attribute for most GIS/RS software

## 8.0 REVIEW OF EXPECTATIONS AND FEARS

At the end of the workshop, a review of the expectations and fears was undertaken to determine to what extent the workshop objectives had been achieved and participants fears addressed.

From the plenary review, most of the expectations and fears had been addressed except for the following:

- ***Understanding the relationship between ILUA and REDD+.***  
Integrated Land Use Assessment is a continuous activity in the department to provide information for sustainable management of forest resources. The REDD+ programme will be using some of the information collected by ILUA for implementation of MRV and GHG. ILUA data will be used by various sectors for sustainable land resources management.
- ***Understanding how to measure and calculate carbon credits.***  
This fear was to some extent addressed when professor Yamba emphasized that the carbon credits are the balances accrued after assessing the performance of the interventions implemented to reduce emissions within the specific time frame agreed upon to do so.
- ***To begin implementation of REDD+ after the workshop.***  
It was explained that the REDD programme is a process which has started with certain activities. To begin to implement some of these activities such as data collection is the beginning of the implementation process.
- ***Complexity of issues under discussion.***  
This fear was partially addressed and participants were urged to go and start implementing the use of GIS and collection of information for input into the MRV process.
- ***Centralised activities for MRV and GHG.***  
The participants were assured by the Chief Extension Officer that the process of decentralisation had started and that the department was committed to ensuring that the process is decentralised even further. The REDD+ coordinator further explained that implementation of some REDD+ activities will be supported and implemented in the district by NGOS concurrent with the National initiatives. These will be demonstration projects that will not necessarily translate into carbon trading but will address issues of sustainable forest management.
- ***That the REDD+ project may not continue after the end of the project.***

This fear was allayed by the explanation that REDD+ is not a project but a programme that will be institutionalised within the structures of government as a continuous process of dealing with climate change.

This was followed by an evaluation of the workshop reflected below, administered by use of a questionnaire. (See Annex 4)

### 9.0 Responses from the Workshop evaluation

Using a questionnaire, participants were requested to evaluate the Workshop.

Evaluation questions were on whether expectations have been met, the relevance of the material presented and whether time was enough. Other questions, rated on a scale of Excellent, Very Good, good, Fair and Poor, were - the quality of presentations, the quality of presenters and the quality of the facilitator, the logistics, the venue, the food and overall workshop organization.

**Note:** The questionnaire response is based on 46 participants instead of a total number of 58.

#### Overall workshop organization

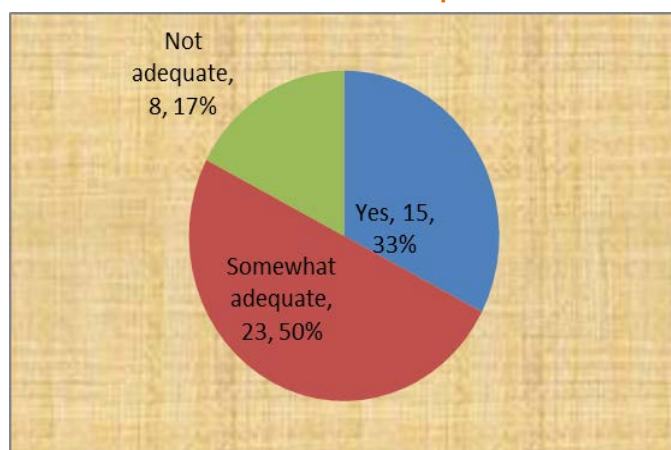


Overall, the participants indicated that the workshop was well organized (rated excellent by 39%; Very good by 43% and good by 17%).

The workshop offered very good platform of gaining knowledge on issues relevant to the participants work, such as climate change and REDD+ and was a good building block for the establishment of MRV road map for Zambia

However participants strongly recommended the organizers to take into consideration the fact that participants coming from Northern, Muchinga and Luapula arrive a day earlier than the expected arrival date and leave a day later due to the scheduled travelling times. Eastern, Western and North Western provinces also require an entire day of travelling. Participants recommended to the organizers to give an option of allowing officers to use one vehicle from the province instead of subjecting them to unnecessary and tiresome public transportation.

#### Time allocated to the workshop.



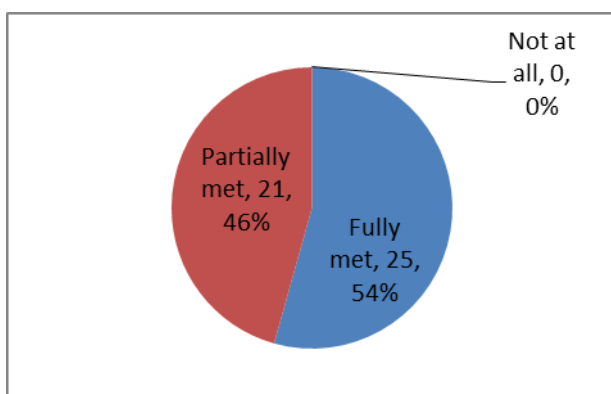
Generally participants felt that the time allocated to this workshop was not enough. Only 15 participants said the time was enough.

Most participants indicated that the workshop should have been held for a longer period (5 days or 10 days) and should have included some time for practicals

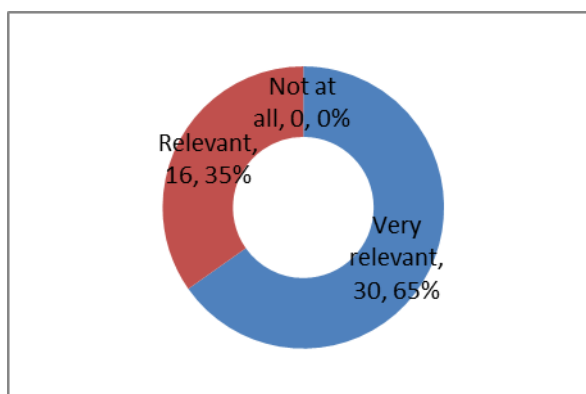
## Workshop Expectation and Relevance of the Material Presented

Participants were asked to state whether the workshop had fully met their expectation, partially met their expectation or not met their expectation at all. 25 participants (54%) said the workshop had fully met their expectation while 21 participants or 46% said the workshop had partially met their expectation.

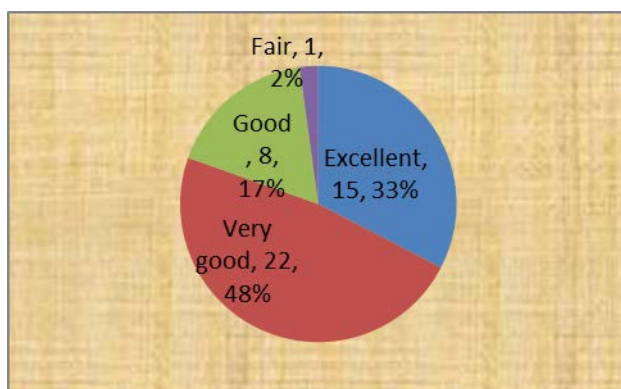
### Has your expectation been met?



### How relevant was the material presented to your work



### Rating of the Quality of presentations



The participants highly rated the materials presented, noting that the material presented is very relevant to their work.

Participants recommended that for similar future trainings, there is a need to have Zambian data to be used per group to have a hands on especially on equations

### Quality of Presenters and the Facilitator

Participants were asked to rate the quality of the presenters and the facilitator from a scale of Excellent, Very good, Good, fair and poor/ Generally the participants were very impressed with both the presenters and the facilitator as can be seen from the scores below.

Rating of Presenters		
Rating	# of Participants	Percentage
Excellent	18	39
Very good	20	43
Good	8	17
	46	100

Rating of Facilitator		
Rating	# of Participants	Percentage
Excellent	15	33
Very good	27	59
Good	4	9
	46	100



## Conference Facilities

The conference facilities were viewed to be of high standards, with 67% of the participants rating the venue to be excellent, 20% rated the venue and very good and 11% gave a good rating. However, one participant (2%) rated the venue as poor.

The food was rated to be excellent by 21 participants (46%), while 12 participants (26%) rated the food to be very good, another 11 participants (24 %) rated the food to be good and two participants (4%) rated the food to be fair.'

## Conclusion

Overall the workshop was timely and well organized and the material very useful. Participants hoped that the similar workshops would be held in future and at such will be rolled to provincial and district level. Participants also stressed the need to maintain consistency amongst the provincial teams that have been established. Some selected comments are included below.

### **Selected comments (quotes) from the Participants on the workshop**

- An eye opener on climate change
- It was a successful workshop and there is need for better MRV activities
- Have certain Zambian data to be used per group to have a hands on especially on equations
- Allocate more time for training and engage more stakeholders e.g. academia
- The organizers should take into account the long distances covered e.g. to expect a person from Mansa, Kasama, Chipata to start off the same day and arrive to a distant place like Kafue Gorge
- Consistence of teams that are being built in the provinces need to be maintained
- We expect that a clear roadmap be made from the two workshops that have been held so far
- You may just consider going further to district staff for better understanding of REDD+ in terms of information sharing of workshop material
- More training should be conducted in provinces. More follow up in the provinces to refresh on the acquired knowledge
- There is need to ensure that the report is done and sent to all participants within two weeks and knowledge gained need to be enforced
- Best way for adult leaning is hands on after theory. Forest carbon assessment if practically done would enhance my motivation towards reduction of emissions from deforestation and forest degradation. Venue was excellent, no interruptions from outsiders, conducive environment
- The workshop should be continued on a quarterly basis and monitoring be done at provincial level. More follow up in the provinces to refresh on the acquired knowledge
- Avail workshop outcomes in a compiled workshop proceedings document and solicit for feedback from participants. Facilitate a network of persons, institutions as a society for Sustainable Forest Management.
- This workshop has been rated as an advanced and more professional hence expansion of time frame ought to be considered in future
- Such workshop should be encouraged because they provide more knowledge on new phenomena such as climate change, MRV etc
- Too many in-house issues being discussed – not everyone is from the Forestry Department

## 9.0 CLOSING REMARKS BY THE CHIEF EXTENSION OFFICER

Before the closing remarks by the Chief Extension Officer (Mr Sangulube) –Department of Forestry, all participants who successfully attended and participated during the workshop were awarded a certificate which was done in a ceremonial style.

Then CEO thanked the participants for attending and for their contribution. He said the workshop was an important step of capacity building towards the REDD+ Readiness process and MRV development. He stated that the workshop was one of many that have been arranged to ensure that stakeholders are ready for REDD+ implementation. The workshop is a foundation for a continued process of work in developing forest and land monitoring system.

He implored the participants to support the process through data generation and analysis and to make use of the GIS equipment that had been procured for the provinces.

## 10.0 RECOMMENDATION

- ❖ As a way forward, the country needs to focus on the Reference Emission Level. To do this the following may be needed:
  - *Formalization institutional arrangements for MRV system for GHG reporting*
  - *Collection of data (activity data and emission factors) is key in the operationalization of the technical requirements.*
  - *Identification of institutions with the capacity to move the process in terms data collection*
  - *Undertake actual work through learning by doing ( Activity data preparations, Emission factor preparations, GHG and reference scenarios )*
  - *Project identification*
  - *Formulation of National strategy on MRV and GHG Reporting*
  - *Implementation of MRV system*
- ❖ The training days for the workshop should be extended- period was too short (3days)
- ❖ More follow-up workshops/training need to be done.
- ❖ All stakeholders identified during the work need to be brought on board.
- ❖ There is great need to update Zambia's policies and legislation in order to take into account emerging issues such as climate change, trans- boundary trade and participatory forest management in order to attract investment into the sector.
- ❖ Participatory Approach should be adopted at all levels of REDD+ Project

## Annex 1: List of participants

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## Annex 2: Programme for the Workshop

Day 1 27.5.2012	Arrival at Kafue Gorge Training Centre (Check in afternoon)	Timing
Day 2 28.5.2012	Registration	08:00 to 08:30
	Official opening and opening remarks. Director Forest Department	08:30 to 08:45
	Introductions of the Participants	08:45 to 09:00
	Introduction to REDD by NPC Coordinator by <i>Mr. Kasaro</i>	09:00 to 10:00
	Break	
	Overview of Science of Climate change and Forest Carbon and Overview of National GHG Inventory and Reporting Format by <i>Prof Yamba</i>	10:30 to 13:00
	Lunch	
	MRV and GHG by <i>Dr. Julian Fox</i>	14:00 to 15:00
	UNFCCC, IPCC and REDD+ by <i>Dr. Julian Fox</i>	15:00 to 16:00
	Introduction to TerraAmazon and REL by <i>Dr. Julian Fox</i>	16:00 to 17:00
Closing remarks and introduction to Day 3	17:00 to 18:00	
Day 3 29.5.2012	Refresher of concepts from Day 1; REDD+, MRV, and GHG	08:30 to 10:00
	Break	
	IPCC Land Use, Land Use Change and Forestry Methodologies and Introduction to practical exercise by <i>Prof. Yamba</i>	10:00 to 13:00
	Lunch	
	Introduction to group work	14:00 to 14:30
	Group work on capacity assessment for MRV and GHG in Zambia	14:30 to 16:30
	Reporting back from group work	16:30 to 17:30
	Synthesis of institutional capacity, gaps and needs	17:30 to 18:00
Closing remarks and introduction to Day 4	18:00 to 18:30	
Day 4 30.5.012	Review of Day 2 and 3	08:30 to 09:00
	Introduction to group work	09:00 to 09:30
	Group work on an MRV road map for Zambia	09:30 to 12:00
	Reporting back from group work	12:00 to 13:00
	Lunch	
	Synthesis of the road map	14:00 to 15:00
	Summing up and final comments	15:00 to 16:00
	Certificate presentations and feedback session	16:00 to 17:00
Workshop closing	18:00	
Day 5 31.5.2012	Depart Kafue Gorge Training Centre	

### **Annex 3: Directors Speech**

#### **MINISTRY OF LANDS, NATURAL RESOURCES AND ENVIRONMENTAL PROTECTION FORESTRY DEPARTMENT**

#### **GHG AND MRV TRAINING AT KAFUE GORGE TRAINING CENTRE**

TALKING NOTES FOR THE DIRECTOR OF FORESTRY AT KAFUE GORGE TRAINING CENTRE DURING THE TRAINING PROGRAMME ON GHG AND MRV FROM 28th TO 30th MAY 2012

THE CHAIRPERSON  
COURSE PARTICIPANTS  
LADIES AND GENTLEMEN

IT IS WITH GREAT PLEASURE THAT, ON BEHALF OF THE FORESTRY DEPARTMENT AND INDEED ON MY OWN, I EXTEND TO YOU A VERY WARM WELCOME TO THIS IMPORTANT TRAINING PROGRAMME. I EXTEND MY SPECIAL WELCOME TO THE PROVINCIAL TEAMS THAT HAVE TRAVELLED LONG DISTANCES TO COME ATTEND THIS TRAINING.

THE CHAIRPERSON

THE PURPOSE OF THIS TRAINING PROGRAMME IS TO BUILD THE CAPACITY OF STAKEHOLDERS IN GREEN HOUSE GAS (GHG) REPORTING AS WELL AS MEASUREMENT, REPORTING AND VERIFICATION SYSTEM AS SUPPORT TO THE READINESS PROCESS IN ZAMBIA.

WHILE REDD IS A NEW NAME, THE ACTIVITIES TO ENSURE REDUCED DEFORESTATION AND FOREST DEGRADATION ARE WELL KNOWN TO US AND INCLUDE CONSERVATION AGRICULTURE, COMMUNITY BASED NATURAL RESOURCE MANAGEMENT, JOINT FOREST MANAGEMENT, SUSTAINABLE ENERGY PROJECTS (SOLAR, IMPROVED STOVES. ETC), ENHANCING POLICY AND LEGISLATIVE FRAMEWORKS.

REDD THEREFORE CALLS FOR AN INTEGRATED APPROACH TO FOREST AND LAND MANAGEMENT. THIS IS THE MORE REASON WE HAVE CALLED STAFF FROM DIFFERENT INSTITUTIONS AT PROVINCIAL LEVEL.

THE CHAIRPERSON

AS YOU ARE AWARE, ZAMBIA IS FACED WITH A NUMBER OF CHALLENGES IN REDUCING DEFORESTATION AND FOREST DEGRADATION CAUSED BY VARIOUS FACTORS. THE MAIN FACTORS INCLUDE:

- ENERGY REQUIREMENT;
- UNSUSTAINABLE AGRICULTURAL AND UNSUSTAINABLE LANDUSE PRACTICES;
- TIMBER AND NON TIMBER FOREST PRODUCTS EXTRACTION;
- MINING AND;
- INFRASTRUCTURE DEVELOPMENT.

THE CHAIRPERSON

AS YOU MAY BE AWARE LANDUSE CHANGE AND ESPECIALLY DEFORESTATION CONTRIBUTES ABOUT 20% OF GREEN HOUSE GAS EMISSIONS. AT INTERNATIOONAL LEVEL IT HAS BEEN RECOGNISED THAT ADDRESSING THE DRIVERS OF DEFORESTATION IS ONE OF THE CHEAPER WAYS TO MITIGATE AGAINST THE IMPACT OF CLIMATE CHANGE.

THE CHAIRPERSON

THE ABILITY OF THE STAKEHOLDERS TO ASSESS AND MONITOR LANDUSE CHANGES AIMED AT ADDRESSING THE DRIVERS OF DEFORESTATION IS KEY AT THIS TRAINING. UNDERSTANDING DRIVERS OF DEFORESTATION AND SOURCES OF GREEN HOUSE GAS EMISSIONS IN LANDUSE, LANDUSE CHANGE AND FORESTRY WILL ENHANCE OUR CAPACITY TO EFFECTIVELY MONITOR THE SOURCE AND POTENTIAL CHANGES. THIS WILL ENABLE US TO PLAN OUR DEVLOPMENT BY ADRESSING DRIVERS OF DEFORESTATION.

THE CHAIRPERSON

I AM AWARE THAT AMONG THE ITEMS YOU WILL COVER UNDER THIS TRAINING IS TO ASSESS THE GAPS IN TERMS OF MRV AS WELL AS DEVELOPING A ROAD FOR MRV DEVELOPMENT. I WISH TO URGE YOU TO DISCUSS FREELY TO ENSURE THAT ZAMBIA IS READY FOR REDD+.

THE CHAIRPERSON

I WISH TO URGE YOU ALL TO FREELY PARTICIPATE AND CONTRIBUTE TO MAKING ZAMBIA READY FOR REDD

I THANK YOU AND MAY GOD BLESS YOU ALL.

**Annex 4: Evaluation Questionnaire of the Workshop on Measurement, Reporting, Verification (MRV) and Greenhouse Gas GHG Reporting to Support REDD + in Zambia held at the Kafue Gorge from 27.5.12 to 31.05.12**

Has Your Expectation been met?

1. Fully met
2. Partially met
3. Not at all

How relevant was the material presented to your work?

1. Very relevant
2. Relevant
3. Not at all

Time allocated to this workshop was adequate

1. Yes
2. Somewhat adequate
3. Not adequate

How was the quality of presentations?

1. Excellent
2. Very Good
3. Good
4. Fair
5. Poor

How was the quality of presenters?

1. Excellent
2. Very Good
3. Good
4. Fair
5. Poor

How was the quality of the facilitator?

1. Excellent
2. Very Good
3. Good
4. Fair
5. Poor

Your rating of Logistics

1. Excellent
2. Very good
3. Good
4. Fair
5. Poor

Your rating of the venue

1. Excellent
2. Very Good
3. Good
4. Fair
5. Poor

Your rating of Food

1. Excellent
2. Very good
3. Good
4. Fair
5. Poor

Overall workshop organization

1. Excellent
2. Very Good
3. Good
4. Fair
5. Poor

Comments for future improvements or general comments