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Technical Guidance for the Quantification of Carbon Benefits in ITTO Projects

[Developed under RED-PA 069/11 REV.1 (F): QUANTIFYING CARBON BENEFITS OF ITTO PROJECTS]

SYNTHESIS REPORT

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The views expressed in this report do not necessarily reflect those of ITTO or its country members. The author would like to express her gratitude to several experts that provided comments during the implementation of the project including Frank Werner, Frank Sperling, Hans-Jörg Althaus, Joachim Sell, Patricia Tobon, Pete Smith, Paul Chai, Victor Agyeman and Thelma Krug, as well as FAO experts Susane Braatz, Serena Fortuna, Eduardo Mansur, Mette Loyche-Wilkie, Marco Piazza, Leslie Lipper and Simmone Rose; Moriz Vohrer from The Gold Standard and Summer Montacute from the VCS Association

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1 INTRODUCTION

The International tropical Timber Organisation (ITTO) is interested in quantifying its contribution towards mitigating climate change. Consequently the ITTO proposed a project into the REDDES Thematic Program, which is aimed at contributing to the enhancement of forest carbon benefits in support of SFM in the tropics through clarification of the potential of various forest management activities as means for REDD+ (RED-PA 069/11 Rev.1 (F)). Specifically, the project aims at estimating carbon benefits of selected ITTO projects in conservation, restoration, REDD+ and sustainable forest management with a view to developing technical guidance for the quantification of carbon benefits and assuring co-benefits. Outcome indicators of this project are:

- Output 1: the assessment of documented information and experience that allows making a quantification of carbon benefits achieved; and
- Output 2: technical guidance for forest carbon stock measurement and monitoring of future ITTO projects in climate change mitigation.

This synthesis report summarizes the outcomes of the project RED-PA 069/11 Rev.1 (F). More detailed information can be found in the following documents:

- Fast-track estimation of climate change mitigation contribution from forestry activities – sCreen
- Quantifying the carbon benefits of ITTO projects - Project reports
  - Colombia: Alternative financing model for sustainable forest management in San Nicolas
  - Ghana: Women and Tropical Forestry Development Program (Phase1)
  - Malaysia: Development of Lanjak Entimau Wildlife Sanctuary as a totally protected area
- Technical guidance for the quantification of carbon benefits in the design and implementation of ITTO projects

2 FAST-TRACK ESTIMATION OF THE CONTRIBUTION OF FORESTRY ACTIVITIES TO CLIMATE CHANGE MITIGATION - SCREEN

We developed a comprehensive methodology for screening potential climate change mitigation benefits from all forestry activities in a coherent and transparent manner. It includes five methods as follows; carbon sequestration (CS), carbon enhancement (CE), greenhouse gas emissions reduction from degradation (ER_1), green house gas emission reductions from deforestation (ER_2) and quantification of timber and wood products (TW). Further we produced a excel based calculation routine and use it in three ITTO projects (Colombia, Ghana and Malaysia). The 5 methods and the corresponding initial calculation routine are called **sCreen**.

The use of **sCreen** allows making a screening of potential carbon benefits of all forestry activities in a project including conservation, forest management, restoration, plantations, agroforesty or wood production (see figure 1). Furthermore **sCreen** is a flexible tool that allows to use information from management plans and to combine it with default values for carbon quantification according to the specific data availability in any project.

2.1 Methodology

The 5 methods in **sCreen** are generic and aimed at providing information about the potential contribution of forestry activities towards mitigating climate change in a systematic manner. The **sCreen** methodology includes 5 complementary methods as follows:

1. **Carbon sequestration (CS):** In this method there was no land use change expected at the beginning of the project and the baseline is then non-forest land use (e.g. pasture). The proposed forestry activity is plantations or agroforestry. Thus a land use change from pasture (non-forest) to forest will take place over time. This implies an increment of the carbon stocks due to the implementation of the forestry activity that corresponds to carbon sequestration as mitigation effect over time. The potential carbon benefit of timber and wood products produced through plantations or agroforestry will be calculated separately using method TW (below).

2. **Carbon enhancement (CE):** The baseline/reference is degraded forest. The proposed forestry activity is restoration or rehabilitation of secondary forest. As a consequence the density of carbon per hectare will increase, thus having carbon enhancement as a carbon impact. If timber/wood production is foreseen this will be estimated separately using method TW (below).

3. **Greenhouse gas emissions reduction from degradation (ER_1):** In this method ongoing degradation that will stop before becoming deforestation is the baseline/reference scenario. N example of such baseline/reference is ongoing degradation through firewood gathering and/or illegal logging. The proposed forestry activities can be sustainable forest management or conservation. Through these greenhouse gas emissions from degradation will be reduced and some carbon stocks can increase. The potential carbon benefit of timber and wood produced through SFM will be estimated separately using method TW (below).

4. **Greenhouse gas emissions reduction from deforestation (ER_2):** In this method deforestation as baseline/reference scenario. The proposed forestry is either sustainable forest management or conservation. Due to these activities no land change will take place and therefore the carbon stocks will remain, thus having a reduction of GHG emissions from deforestation as a carbon impacts over time. The potential carbon benefit of timber and wood produced through SFM will be measured separately using method TW (see below).

5. **Quantification of timber and wood products (TW):** This method focus on the potential carbon benefit of timber and wood products can have over time. Timber and wood products can be used either in harvested wood products (e.g. paper, furniture or building components) or as biofuels. The potential mitigation impacts are either increasing a carbon pool in the biosphere (trough harvested wood products) or the substitution of other materials (e.g. fossil fuels). These impacts are determined by the specific use in each case and are dependent of the context in which it takes place. This method is only aimed at estimating the potential that goes out of the forestry activities. An accurate calculation, especially of the substitution effect requires a specific method and detailed information about the use of timber and wood outside the system boundary as defined in this methodology

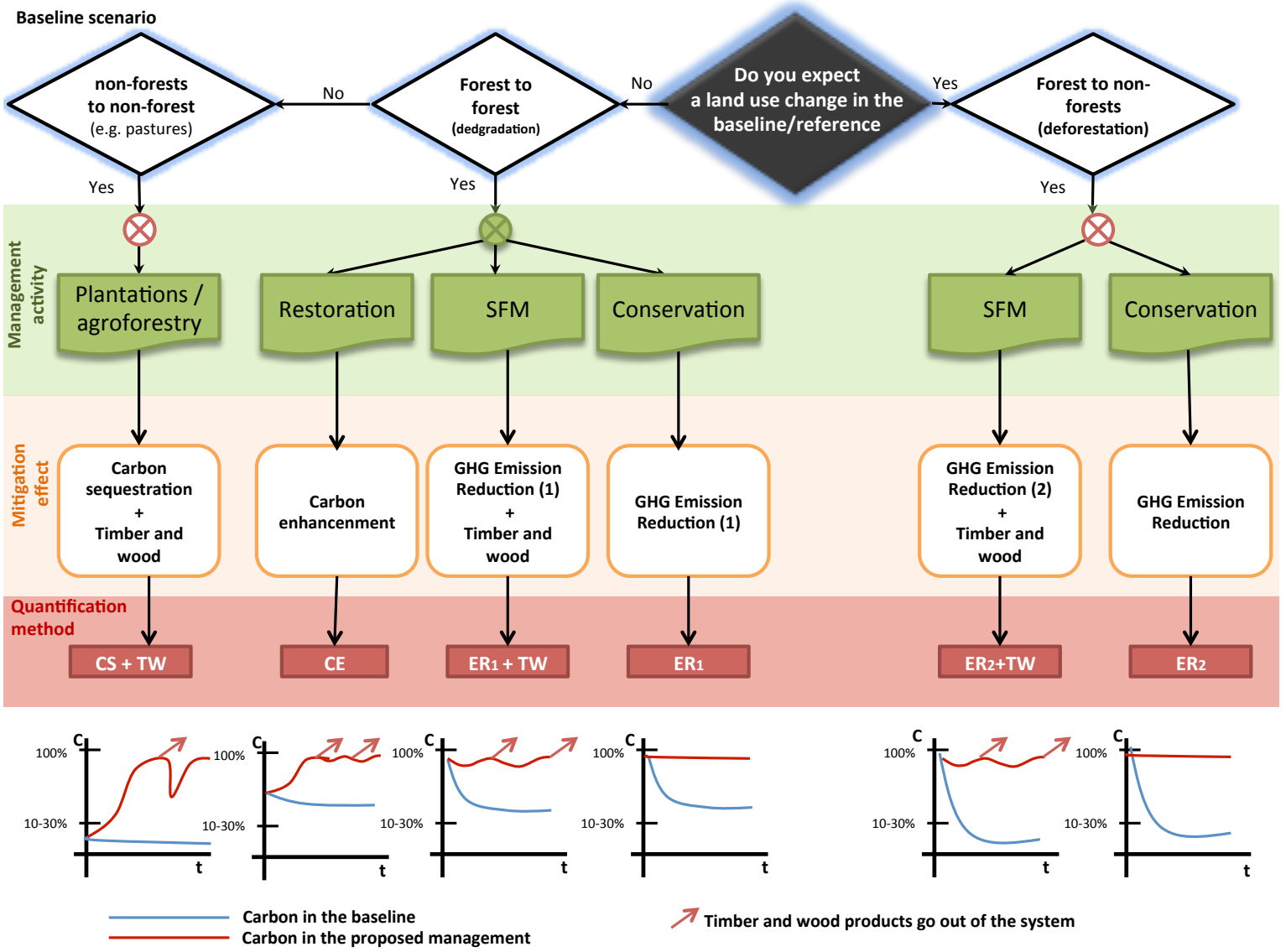

Figure 1: Rational of the included in **sCreen** methods

2.2 Case studies

2.2.1 Colombia: Alternative financing model for sustainable forest management in San Nicolas

Two phases of this project were included in the case study: Phase I: PD 54/99 Rev. 2 (F) and Phase II: PD 240/03 Rev. 1 (F). The two phases of the "San Nicolas" project considered SFM, timber production and quantification and valuation of ecosystem services, including carbonic and non-carbonic ecosystem services. During phase I the potential carbon benefits from the landscape master plan[1] over a period of 40 years was quantified. Further, the designed a for forest activities in the Clean Development Mechanism (CDM and started negotiations with the BioCarbon Fund of the World Bank for selling carbon certificates. Phase I included a quantification of carbon benefits of forestry activities beyond the eligible activities for the CDM, specifically enrichment and active conservation (i.e. SFM). The results of the potential carbon benefits as quantified in phase I are 1.62 million TCO_{2e} for the CDM and 1.12 million TCO_{2e} for the non-CDM component over 40-year lifetime (EcoSecurities, 2003). This calculation included 14 CDM eligible activities in a 9,400 (Agroforesry and plantations) ha and 4 non-CDM activities (enrichment) in 7,300 ha (EcoSecurities, 2003).

Phase II focused on the implementation of pilot activities included in the landscape master plan (phase I) as well as on the planning of rehabilitation activities and the quantification and valuation of other environmental services and included forestry activities from agroforestry to rehabilitation and conservation. However in the second phase the potential carbon benefits were not quantified.

The estimation with sCreen looked to the forestry activities as implemented in the area. An ex-post evaluation is of the twos phase of the San Nicolas project was ongoing at the moment of the estimation with sCreen. The former project director and project team members gently provided data on stage of implementation. A more accurate quantification of the carbon benefits will need the information of monitoring protocols.

Total area *(ha)*	*1,159*	*68*	*241*	*264*	***1,732***
Years	**Carbon Sequestration** (TCO2e)	**Carbon Enhancement** (TCO2e)	**Emission Reduction1** (TCO2e)	**Emission Reduction 2** (TCO2e)	**Total per year** (TCO2e)
2006	0	0	5,612	22,770	**28,382**
2007	2,314	2,615	11,225	44,600	**60,754**
2008	11,195	5,967	16,837	66,431	**100,429**
2009	27,226	9,319	22,449	88,261	**147,256**
2010	48,884	12,671	28,061	113,802	**203,419**
2011	70,542	16,023	33,674	113,313	**233,552**
2012	92,200	19,320	39,286	112,824	**263,630**
2013	113,858	20,058	44,898	112,335	**291,148**
TOTAL	**113,858**	**20,058**	**44,898**	**112,335**	**291,148**

[1] A "landscape management plan" was designed jointly with the major social actors in the region during the phase I of the project. This master plan in aimed at clarifying an strategic and sustainable use of the landscape for the following 25years. It includes activities in plantations, agroforestry, silvopastoral and conservation. The master plan enunciates the need to carefully design activities in rehabilitation. Phase II of the project undertook the design and concerted agreement of activities aimed at rehabilitation. Further, the master plan includes the feasibility study and the income opportunities of all activities.

Table 1: Total potential carbon benefits of the activities implemented in San Nicolas 2006 – 2013 estimated with sCreen

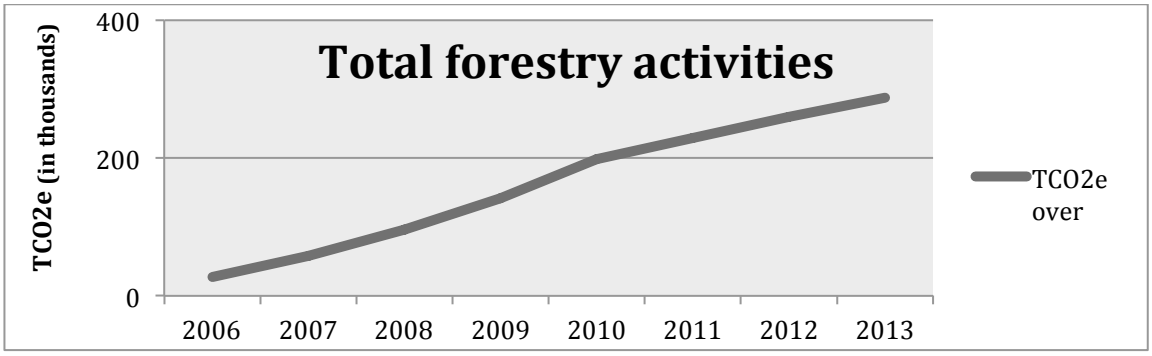

Figure 2: Evolution of the potential carbon benefits from San Nicolas 2006 – 2013 using sCreen

The San Nicolas project is the only case where we could use all methods included in sCreen, because it considers a wide range of forestry and agroforestry activities in the landscape master plan.

2.2.2 Ghana: Women and Tropical Forestry Development Program

Two phases of this project have been implemented. However the estimation of the potential carbon benefits considered only the first phase, because the ex-post report focused on it. The project didn't consider climate change mitigation or carbon benefits in its objectives. Assumptions for the estimation of the potential carbon benefits are based either in the ex-post evaluation report (full version) or on relevant literature. Main assumptions are a) the baseline for the plantations was stable without significant changes in carbon stocks over time, probably was pastures or subsistence agriculture; and b) the reforestation activities we use *Tectona grandis* as a main species and consider the differences in growth according to the ecological zones s mentioned in the ex-post evaluation. For NTFP average default values were used.

We estimated the potential carbon benefit from the Women and Tropical development Program in Ghana during the period 1996 – 2013 as 113,991 TCO_{2e} (31,145 TC) (see figure 3). Potential impacts from timber and wood were not included as the first rotation is still ongoing. All 7 activities from the project were quantified using one method, carbon sequestration (CS).

Total area (ha)	*794*	***794***
METHODS	Carbon Sequestration (TCO2e)	Total per year (TCO2e)
1996	0	**0**
1997	2,225	**2,225**
1998	7,190	**7,190**
1999	14,362	**14,362**
2000	21,535	**21,535**
2001	28,707	**28,707**
2002	35,880	**35,880**
2003	43,052	**43,052**
2004	50,224	**50,224**
2005	57,397	**57,397**
2006	64,569	**64,569**
2007	71,741	**71,741**
2008	78,914	**78,914**
2009	86,086	**86,086**
2010	93,218	**93,218**
2011	100,333	**100,333**
2012	107,304	**107,304**
2013	113,991	**113,991**
TOTAL	**113,991**	**113,991**

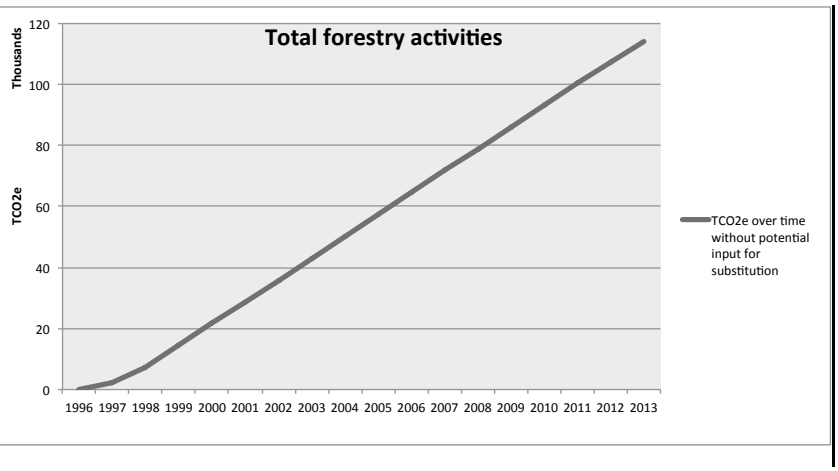

Figure 3: Total potential carbon benefits of the activities implemented and evolution of the potential carbon benefits from the first phase of the project "Women and tropical Forestry Development Program" in Ghana (Phase1) using sCreen

2.2.3 Malaysia: Development of Lanjak Entimau Wildlife Sanctuary as a totally protected area

Four phases were included in the case study: Phase I: PD 106/90 Rev. 1 (F), Phase II: PD 15/95 Rev. 3 (F), Phase III: PD 16/99 Rev. 2 (F), Phase IV: PD 288/04 Rev. 2 (F). None of the four phases of this project considered climate change mitigation or carbon benefits. Thus some of the relevant information for making the calculation of carbon benefits wasn't available in the project documents, especially data and information for the baseline.

In order to make possible the quantification of potential carbon benefits of the four phases of the Lanjak-Entimau Wildlife Sanctuary project (LEWS) projects we made some assumptions based on relevant literature. No ex-post evaluation confirming actual values was available, thus estimation was done using the information provided by the project documents and/or using default values and after confirmation from the former project leader Dr. Paul Chai. For the estimation we assumed that deforestation was stopped and SFM activities started in 1997 and according to the management plan and the recommendations of the ITTO mission in 1996-97.

Using sCreen we estimated that between 1997 and 2013 a potential carbon benefit from forestry activities in the area of the Lanjak-Entimau Wildlife Sanctuary of 43.2 $MtCO_{2e}$ (ca.11.8 MtC). The main activities were emissions reduction through sustainable forest management and carbon sequestration through agroforestry (see table 2 and figure 4).

Estimated carbon benefits from LEWS - Malaysia

Total area (ha)	*91*	*168,000*	***168,091***
	Carbon Sequestration (TCO2e)	**Emission Reduction 2** (TCO2e)	**Total per year** (TCO2e)
1997	0	5,784,091	**5,784,091**
1998	0	10,608,969	**10,608,969**
1999	0	15,433,846	**15,433,846**
2000	0	20,258,724	**20,258,724**
2001	0	25,083,602	**25,083,602**
2002	0	29,430,616	**29,430,616**
2003	0	30,258,774	**30,258,774**
2004	0	32,124,611	**32,124,611**
2005	0	32,433,929	**32,433,929**
2006	0	34,818,605	**34,818,605**
2007	0	35,127,923	**35,127,923**
2008	0	37,512,599	**37,512,599**
2009	1,964	37,821,918	**37,823,882**
2010	3,928	40,206,593	**40,210,521**
2011	5,892	40,515,912	**40,521,804**
2012	7,855	42,900,588	**42,908,443**
2013	9,819	43,209,906	**43,219,725**
TOTAL	**9,819**	**43,209,906**	**43,219,725**

Table 2: Summary balance of the potential carbon benefits for LEWS using sCreen

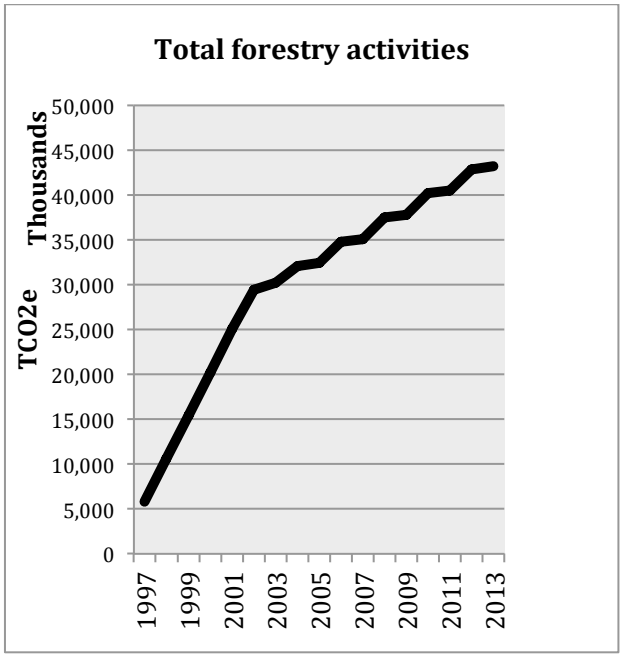

Figure 4: evolution of the potential carbon benefits from LEWS 1997 – 2013 using sCreen

3 TECHNICAL GUIDANCE FOR PROMOTING CARBON BENEFITS IN THE DESIGN AND IMPLEMENTATION OF ITTO PROJECTS

The technical guidance is a response to the increasing need to support forest managers in:

a) increasing their knowledge regarding scientific, technical and social aspects for climate change mitigation and forestry
b) their efforts to include climate change mitigation as management objective
c) understanding the possibilities to get carbon finance/payments for forestry activities
d) monitoring and reporting carbon benefits from ITTO co-funded activities

The guidance is aimed at facilitating decisions for using climate mitigation mechanisms, either within the UNFCCC or in the voluntary markets. Target population is forest managers and decision-makers at the FMU level. The guidance considers and builds up on a wide number of existing guidelines for forest and mitigation to climate change. The guidance helps when a forest manager is looking for answers to the following questions:

- How to find out the size of the potential carbon benefit of my intervention? Is this potential significant?
- If this potential is significant, what are the possible climate mitigation frameworks available?
- Which one is the climate mitigation framework that fits best to my circumstances?: Should I go to the voluntary market? To the CDM market? Is REDD+ an option?
- How do I select a methodology that fits to my circumstances?
- What are the implications in terms of data collection?
- What are available methods and tools for monitoring carbon benefits according to the different mitigation frameworks
- Last but not least: How can I monitor and report carbon benefits for the ITTO, even if my project is not participating in any mitigation framework?

A complete draft of the guidance was given for review of international experts end of July 2013. The review process took until mid September.
The technical guidance is structured as follows:
Chapter 1 and 2 introduce the guidelines and present the scope and target population.

Chapter 3 presents an ***overview of the main concepts*** needed for estimating carbon benefits from forestry activities. It includes an explanation of ex-ante estimation and ex-post quantification of carbon benefits as well as clarification on stratification, permanence, leakages, uncertainties and data availability. The chapter is based on a wide review of current scientific knowledge.

Chapter 4 presents a ***taxonomy of the mitigation frameworks***, including the UNFCCC, other regulated markets and the so-called "voluntary market". Regarding the UNFCCC the guidance includes an update of the decisions regarding REDD+[2], A/R CDM[3] and programmatic CDM as well as of the current experience including forestry in NAMAs[4]. When discussing the other regulated markets the guidance presents the California Climate Action Registry (CCAR) and the Climate Action Reserve (CAR) as well as the Chicago Climate Exchange (CCX). When presenting the standards used in the "voluntary market" the guidance focuses on six of the major standards used today: American Carbon Registry; Climate, Community and Biodiversity (CCBS); Plan Vivo; The Gold Standard and the Verified Carbon Standard (VCS).

[2] REDD+: Reducing emissions from deforestation and forest degradation in developing countries; and the role of conservation, sustainable management of forest and enhancement of forest carbon stocks in developing countries
[3] A/R CDM: Afforestation and Reforestation in the Clean Development Mechanism
[4] NAMA: Nationally appropriate mitigation actions by developing country Parties

Chapter 5 presents a ***roadmap of steps to be taken at the FMU level*** to be taken for including carbon benefits and climate change mitigation in project activities. The section is organized following ***a step-wise approach*** (see figure 5). By each step the guidance clarifies three questions: i) why is the step necessary); ii) how to do the step; and iii) what to do if there are significant changes over time. It contains the following steps;

1. Definition of boundaries,
2. Identification of institutional framework,
3. Definition of management priorities at the FMU level,
4. Identification of potential risks,
5. Screening of carbon potentials,
6. A road map for identifying the proper mitigation framework for your FMU (see figure 6),
7. Detailed guidance for monitoring carbon benefits in ITTO projects based on guidance provided by the IPCC and the UN-REDD Programme.

Further chapter 5 includes considerations about legal aspects and an analysis of opportunities and challenges for monitoring carbon benefits from Sustainable Forest Management

In chapter 5 there a detailed update (by August 2013) of the requirements from each mitigation framework at the FMU level, as well as a compilation of the approved carbon accounting methodologies by each mitigation framework and carbon standard. An annex to the guidance presents the existing tools as used in all mitigation frameworks discussed in chapters 4 and 5.

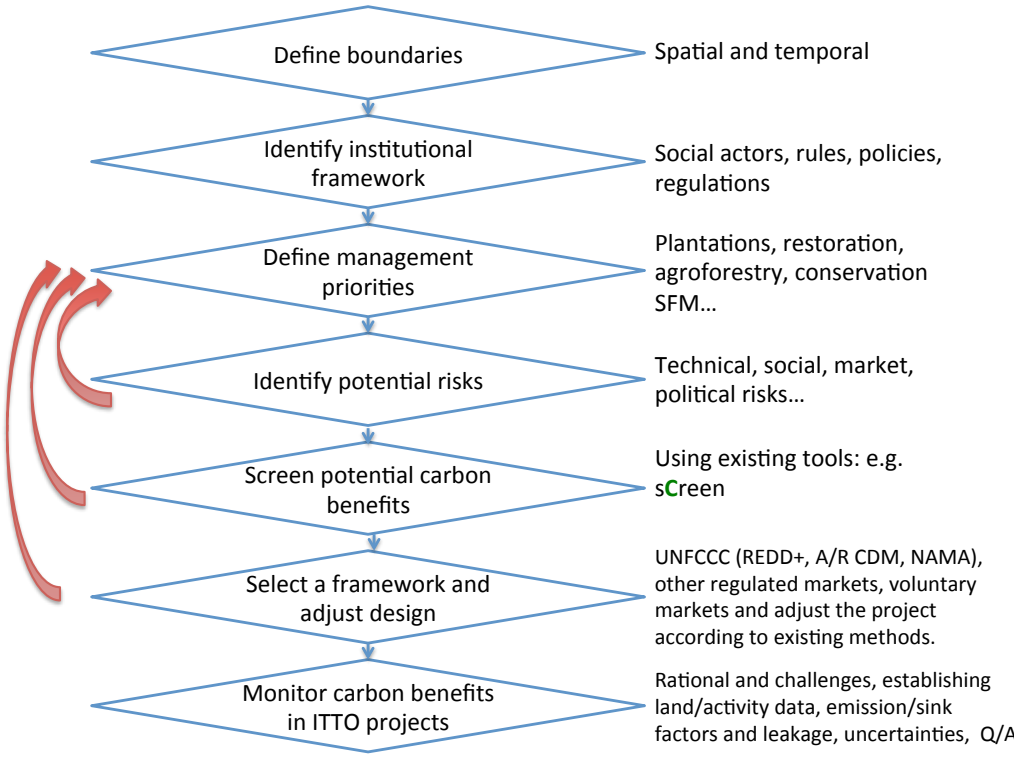

Figure 5: Step-wise approach from activity design to monitoring carbon benefits

Chapter 6 presents the efforts made by ***other multilateral organizations*** towards integrating carbon accountability into their projects. Specifically it presents the guidance produced by the Intergovernmental Panel on Climate Change (IPCC), the Global Environmental Facility (GEF), the joint product from UNDP, UNEP and UNEP-RISOE Centre as well as the guidelines developed by the United Nations Food and Agriculture Organization (FAO).

The guidance has several annexes including i.a. a description of available tools per mitigation framework and a format for reporting carbon benefits from ITTO co-funded projects.

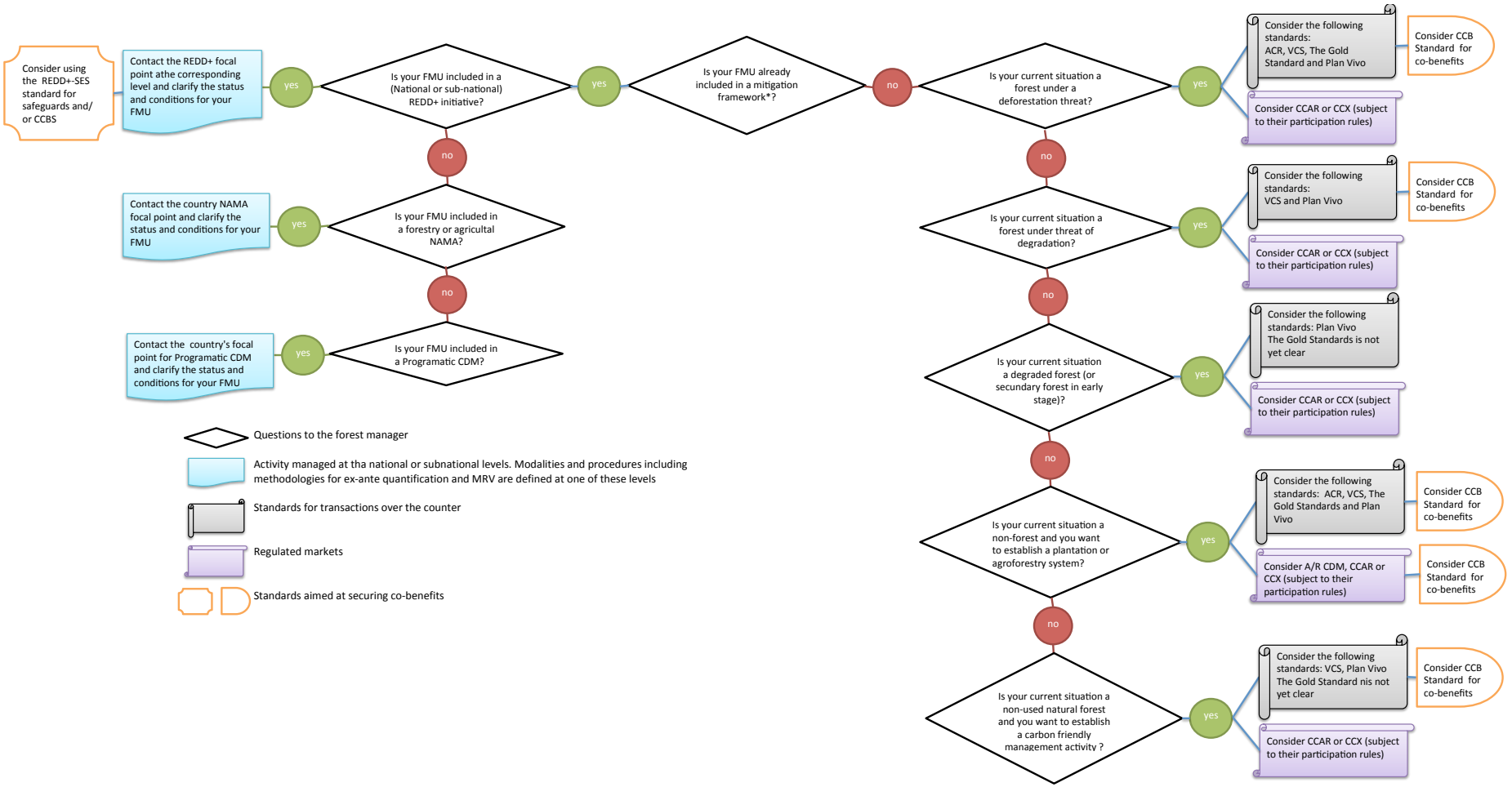

Figure 6: Decision tree for supporting the selection of a mitigation framework at the FMU level

4 RECOMMENDATIONS TO THE INTERNATIONAL TROPICAL TIMBER COUNCIL

The project produced a set of outputs that can facilitate integrating climate change mitigation as one management objective at FMU level. These include a comprehensive methodology for screening climate change mitigation benefits from forestry activities and an initial operationalization of these methods in Excel as well as a detailed guidance for quantifying and monitoring carbon benefits in ITTO projects.

The Council should consider making these outputs useful for its members by undertaking three activities:

i) Making a forest carbon calculation tool (**sCreen Tool)** available to forest managers and decision-makers. That implies to develop a user friendly software tool based on the existing excel calculation routine and to produce the corresponding user guidance.

ii) Approving the "*Technical guidance for the quantification of carbon benefits in the design and implementation of ITTO projects*". We consider the Technical Guidance as a living document. As such and once approved, it can be published at the ITTO webpage and regularly updated according to the developments within the UNFCCC, the other regulated markets and the standards in the voluntary markets

iii) Providing capacity building on **sCreen** and the "Technical guidance for the quantification of carbon benefits in the design and implementation of ITTO projects" to forest managers and decision-makers in ITTO members