Proceedings of the workshop on strengthening the capacities of forest department on GHG accounting for the forestry sector

Bangladesh Forest Department

27 – 29 August 2017

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Food and Agriculture Organization of the United Nations

The UN-REDD Programme, implemented by FAO, UNDP and UNEP, has two components: (i) assisting in developing countries to prepare and implement national REDD strategies and mechanisms; (ii) supporting the development of normative solutions and standardized approaches based on sound science for a REDD instrument linked with the UNFCCC. The programme helps empower countries to manage their REDD processes and will facilitate access to financial and technical assistance tailored to the specific needs of the countries.

The application of UNDP, UNEP and FAO rights-based and participatory approaches will also help ensure the rights of indigenous and forest-dwelling people are protected and the active involvement of local communities and relevant stakeholders and institutions in the design and implementation of REDD plans.

The programme is implemented through the UN Joint Programmes modalities, enabling rapid initiation of programme implementation and channelling of funds for REDD efforts, building on the in-country presence of UN agencies as a crucial support structure for countries. The UN-REDD Programme encourage coordinated and collaborative UN support to countries, thus maximizing efficiencies and effectiveness of the organizations' collective input, consistent with the "One UN" approach advocated by UN members.

The UN-REDD Bangladesh National Program is implemented by the Bangladesh Forest Department under the leadership of Ministry of Environment and Forests. United Nations Development Program (UNDP) and Food and Agriculture Organization (FAO) are the two implementing partners.

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EXECUTIVE SUMMARY

A three-day training workshop on greenhouse gas (GHG) inventory for the agriculture, forestry and other land use (AFOLU) sector was held from 27-29 August 2017 at the Bangladesh Forest Department (BFD). The workshop was organized by the Bangladesh UN-REDD Programme with the technical support from FAO. Mr. Luca Birigazzi, an international GHG expert from FAO Rome was the resource person of the workshop. Six representatives from the Resources Information Management System (RIMS) unit of BFD (of which 3 were female and 3 were male) attended the workshop. The objective was to familiarize participants with the guidelines provided by the Intergovernmental Panel on Climate Change on national GHG inventories for the AFOLU sector and train them on how to compile GHG data and estimate emissions and removals of greenhouse gases. The workshop included theoretical presentations and practical exercises. It was a follow up of previous workshops organized by the national UN-REDD programme and contributed to enhance the capacity of BFD on GHG accounting with a particular focus on the forestry sector. The training also identified challenges regarding the availability of reliable data, which hinders the quality of national GHG inventory. In addition, through the training sessions participants obtained further insights of the importance of accessibility and robustness of country-specific emission factors, for example volume, biomass and carbon stocks in trees.

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1. INTRODUCTION

The preparation of a GHG inventory (GHG-I) is an essential element towards a greener economy while reducing GHG emissions and climate change. The objective of a national GHG-I is to assess the emissions and removals of greenhouse gases that result from human activities. This is important to achieve the ultimate objective of the United Nations Framework Convention on Climate Change (UNFCCC) which is the stabilization of GHG concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.

The development of accurate GHG-I which corresponds to actual emissions and removals is critical, as Parties can identify major sources and sinks, make more informed policy decisions and actions to mitigate emissions and assess the progress of these actions. Therefore, to increase the quality of a national GHG-I all Parties must have access to transparent, complete, consistent, comparable and accurate data. However, several challenges are apparent when conducting a GHG-I. These challenges are partly associated with the lack of technical expertise, and/or sufficient number of qualified experts who will retain overtime.

Hence, capacity building is considered an integral part of all activities related to the preparation and maintenance of a GHG-I. A critical barrier to accurate GHG-I is the limited availability of national GHG expertise, as well as the lack of stable and skilled team that has the capacity to work on various reporting schemes including national communications, biennial updated reports, nationally determined contributions, etc.

Since 2012, FAO in collaboration with the Bangladesh Forest Department has implemented several training workshops (Akhter, 2015; Akhter & Shaheduzzaman, 2012; Islam, Poultouchidou, Akhter, & Henry, 2016; Poultouchidou, Birigazzi, & Akhter, 2016a, 2016b) on GHG inventory for the AFOLU sector. The objective of these workshops was to train individuals from various governments departments and academic institutions on how to compile GHG data for the AFOLU sector. All training activities followed the IPCC guidance and guidelines and are in line with international reporting requirements under the UNFCCC. Accordingly, a training workshop on the preparation of GHG inventory for the AFOLU/LULUCF sector will be held from 27 to 29 August 2017 aiming to continue strengthening the capacities of forest department.

2. OBJECTIVES

This training workshop includes examples, quizzes and exercises and will aim to

- Familiarize participants with the guidelines provided by the Intergovernmental Panel on Climate Change on national GHG inventories for the LULUCF sector
- Train participants to estimate emissions and removals for the LULUCF sector under the UNFCCC guidance using national data
- Provide participants the theoretical knowledge and practical exercises related to carbon stock accounting for the forestry sector
- Train participants to identify which carbon pools must be included in Tier 1 estimate of net carbon stock change in forest land remaining forestland, land converted to forest land as well as other land converted to forest land
- Train participants to calculate net carbon stock change in forestland remaining forest land, other land converted to forest land and forestland converted to other land

3. COUNTRY CONTEXT AND INSTITUTIONAL ARRANGEMENTS

The Government of Bangladesh, as a part of the UNFCCC is committed to submit national communication (NC) reports containing the GHGs inventory from the sectors like Energy, Transport, Industry, Waste, and Land use, land-use change and forestry (LULUCF) every four years. In 2002, the Government of Bangladesh submitted the Initial National Communication (INC) containing GHGs inventory for 1994, and Second National Communication (SNC) report was submitted in 2012, containing GHG inventory for 2001 and 2005. The submission of NC to the UNFCCC from the Government of Bangladesh is the responsibility of the Department of Environment (DoE) under the Ministry of Environment and Forest (MoEF). On the other hand, UN-REDD National Programme is currently instigated in Bangladesh under the Bangladesh Forest Department (BFD) under the Ministry of Environment and Forest (MoEF) with the technical and financial assistance of Food and agricultural organization of the United Nations (FAO), and the United Nations Development Program (UNDP). The overall goal of the UN-REDD National Programme is support the Bangladesh Government to initiate the REDD+ program in Bangladesh to participate in the performance based payment under the REDD+ mechanism. Bangladesh as a member of non-Annex I Parties has technical capacity constraints related to GHGs inventory preparation related with LULUCF, mostly because of inadequate capacity to collect data related with GHGs inventory from LULUCF based on the Intergovernmental Panel on Climate Change (IPCC) suggested methodology like IPCC GPG 2003 or IPCC 2006 guideline.

4. SUMMARY OF THE TRAINING

The 3-day workshop was carried out following the agenda given in Appendix 1. In total six participants (3 male and 3 female) from the Resources Information Management System (RIMS) unit of Bangladesh Forest Department were present.

During the workshop, presentations, exercises and discussions included the following points:

- The importance of monitoring greenhouse gas emissions and removals;
- Challenges associated with the compilation of the national GHG inventory for the AFOLU sector with regard to data availability, absence of data sharing polices and robust institutional arrangements, insufficient documentation and arching;
- Land representation and IPCC approaches and;
- Estimations of emissions and removals for land remaining in the same land category and land converted to different land use. Emissions and removals were estimated for the biomass carbon pool and soil.

The training focused on the methodology for preparing annual greenhouse gas inventories for land use, land use changes and the forestry sector based on the 2006 IPCC Guidelines for National Greenhouse Gas Inventories. Time was mainly allocated practical exercises, in which participants could directly apply the IPCC guidance and calculation procedures.

4.1 IPCC principles

The IPCC principles are critical when compiling a national GHG inventory for the AFOLU sector. A national GHG inventory should be transparent, consistent, comparable, complete and accurate. The application of these principles allows for more reliable data on GHG inventories and GHG emission trends, which are to be provided to the Conference of the Parties to the UNFCCC.

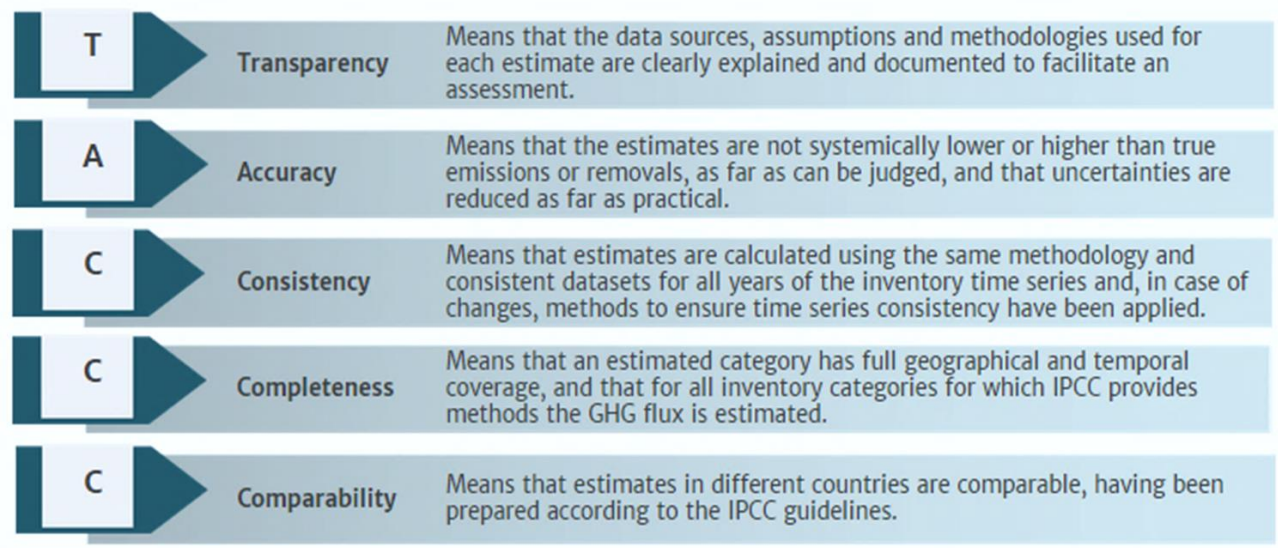

Figure 1. IPCC principles for the preparation of GHG inventory for the AFOLU sector.

4.2 IPCC approaches for land representation

IPCC identifies three approaches for land representation. **Approach 1** (probably the most common) uses area datasets likely to have been prepared for other purposes such as forestry or agricultural statistics. **Approach 2** provides a national or regional-scale assessment of not only the losses or gains in the area of specific land categories but what these changes represent (i.e., changes from and to a category). **Approach 3** requires spatially explicit observations of land use and land-use change. According to the IPCC methodology, three tiers are provided that describe the level of methodological complexity. Tier 1 methods are the simplest to use for which equations and default parameters values are provided in the IPCC Guidelines. Tier 2 methods use country-specific emissions factors that are more appropriate for the climatic regions, land-use systems and livestock categories in the country. Tier 3 methods include models and inventory measurement systems tailored to address national circumstances. The data used in a national GHG inventory should be in line with the principles and approaches of IPCC Guidelines, accompanied by documentation describing the conditions of its derivation and be unbiased and as accurate as possible. All the data used in the national inventory should be robust, applicable and well documented.

4.3 Key category analysis

Key category analysis is an important element of a national GHG inventory. It is the process of identifying the main categories that originate GHG emissions and removals. Key categories represent the significant portion of a country's total emissions. By identifying these key categories, Parties can prioritize their efforts and resources in order to improve their overall estimates. Such a process will lead to improved quality, as well as greater confidence in the emissions/removal estimates that are calculated.

4.4 Exercise on IPCC land categories

In this exercise, participants had to harmonize the classes of the national land cover map 2015 into the IPCC land categories. The proposed IPCC land categories as it was identified by the participants is given in the table below. The harmonisation of certain land cover classes seemed to cause a lot of discussion and these classes are highlighted in yellow in the table given below. In this exercise, participants had also to calculate the net carbon changes in land areas using approach 1. Mock data on land areas were used for this exercise.

Table 1: Harmonization of national land cover classes 2015 to IPCC land categories.

ID	Classes of land cover map 2015	IPCC land classes:
1	Evergreen Hill Forest	FL
2	Mixed Hill Forest	FL
3	Plain Land Forest (Sal Forest)	FL
4	Bamboo Forest	FL
5	Shrub Dominated Area (Terrestrial)	GL
6	Herb Dominated Area (Terrestrial)	GL
7	Rubber Plantation	FL
8	Forest Plantation	FL
9	Orchards & Other Plantations (Trees)	CL
10	Orchards & Other Plantations (Shrub)	CL
11	Single crops	CL
12	Multiple Crop	CL
13	Shifting Cultivation	CL
14	Swamp Forest	FL
15	Mangrove Forest	FL
16	Mangrove Plantation	FL
17	Mud Flats or Intertidal Area	WL
18	Beaches or Sand Bar	OL
19	River Banks	OL
20	Air Por	SL
21	Built-up Non-Linear	SL
22	Brickfield	sL
23	Dump Sites/Extraction Sites	SL
24	Salt Pans	OL
25	Baor	WL
26	Perennial Beels/Haors	WL
27	Rivers and Khals	WL
28	Lake	WL
29	Ponds	WL
30	Fresh Water Aquaculture	WL
31	Brackish Water Aquaculture	WL
32	Rural Settlement	SL
33	Swamp Reed Land	WL
34	Swamp Plantation	FL
FL: forestland, CL: cropland, WL: wetland, GL: grassland, SL: settlement, OL: Other land		

4.5 Exercise on calculating emissions and removals for land remaining in the same land category and land converted to a different land use.

Assessment of emisisons and removals was performed using mock data for the land categories: forestland remaining forestland and land converted to cropland. This exercise was focused on assessing biomass and soil carbon stocks changes using the gain-loss method. The default emission factors provided by the IPCC Guidelines were used to estimate changes in carbon stocks in biomass and soil. Other activity data such as amount of fuelwood and timber extracted from forest were obtained by FAOSTAT.

Table 2: Annual change in carbon stocks in biomass in land remaining in the same category

Sector		**Agriculture, Forestry and Other Land Use**			
Category		**Annual change in carbon stocks in biomass in land remaining in the same category**			
Category code		**3B1a**			
Sheet		**3 of 3**			
Land-use category		Forest Type	carbon stock in the pool at time t1	carbon stock in the pool at time t_2	annual change in carbon stocks in biomass in land remaining in the same category
Initial land use	Land use during reporting year		tonnes C	tonnes C	tonnes C yr^{-1}
			C_{T1}	C_{T2}	ΔC_B
FL	FL	Tropical rain forest	75013841.41	67342105.89	-958966.9402
		Tropical dry forest	29621149.92	42362645.24	1592686.915
		Tropical mountain systems	10864696.88	19978184.34	1139185.932
		Tropical moist deciduous forest	14742807.7	25437921.16	1336889.183
Total					

Table 3: Annual changes in carbon stocks in biomass in land converted to cropland .

Sector		**Agriculture, Forestry and Other Land Use**						
Category		**Land Converted to Cropland: Annual change in carbon stocks in biomass**						
Category code		**3B2b**						
Sheet		**1 of 1**						
Equation		**Equation 2.2**	**Equation 2.16**			**Equation 2.15, 2.16**		
Land-use category			Annual area of Land Converted	Biomass stocks before the	Carbon fraction of dry	Annual biomass carbon	Annual loss of biomass	Annual change in carbon
Initial land use[1]	Land use during reporting year	Subcategories for reporting year	(ha)	(tonnes dm ha^{-1})	[tonnes C (tonne dm)$^{-1}$]	(tonnes C yr^{-1})	(tonnes C yr^{-1})	(tonnes C yr^{-1})
				Table 5.8	0.5	National estimates, or Table 5.9	National estimates, or Table 5.1	$\Delta C_B = \Delta C_G + ((0 - B_{BEFORE}) * \Delta A_{TO\ OTHER}) * CF - \Delta C_L$
			ΔA_{TO_OTHER} s	B_{BEFORE}	CF	ΔC_G	ΔC_L	ΔC_B
FL	CL	Tr_WET_Annual	1000	310	0.5	0	0	-155,000
		Tr_WET_Perennial	625	310	0.5	6250	0	-90,625
Sub-total								
Total								

[1] If data by initial land use are not available, use only "non-CL" in this column.

[2] Annual biomass carbon growth (ΔC_G) is equal to the area of perennial crop that is not mature times biomass accumulation rate (G) using a national estimate or data from Table 5.9. removed (ΔC_L) is equal to the area of perennial crops that is annually harvested times the area-specific carbon stock value that is lost (L) using a national estimate or biomass carbon loss data from Table 5.1.

[3] Annual carbon stock in biomass

5. REFERENCE

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APPENDIX 1. AGENDA

Venue	Forest Department	
Sunday 27 August 2017		
09.00 – 17.00	- Why it is important to monitor GHGs from the LULUCF/AFOLU sector - Drivers of climate change - The role of UNFCCC and its important achievements - Reporting requirements in the context of UNFCCC - What has been reported from Bangladesh on the AFOLU sector (First NC, SNC, TNC, INDC etc.) - Identify causes of GHG emissions and removals in the AFOLU - Trends in GHG emissions at a global and national level	Nazmul Islam
	Quiz	
	- Steps for preparing a national GHG-I for the AFOLU/LULCF sector - Main elements that should be included in a national GHG-I - Methodological requirements that should be followed when compiling a GHG-I: IPCC Guidelines; Generic methodological approach; Tier methods; TACCC principles	Anatoli Poultouchidou
	Quiz	
	- Land representation - IPCC land categories - IPCC approaches - Uncertainties - Land use database - Land stratification	Luca Birigazzi
	Exercise: Harmonizing the land cover classes 2015 to the IPCC classes	
	Discussion and wrap up of the day	
Monday 28 August 2017		
09.00-17.00	Estimating C stock changes in FL remaining FL [degradation and C enhancement]	Luca Birigazzi
	Exercise	All
	Estimating C stock changes in FL converted to other land [deforestation]	Luca Birigazzi
	Exercise	All
Tuesday 29 August 2017		
09.00-17.00	Estimating emissions from forest vegetation fires	
	Exercise	
	Calculate emissions from organic and mineral soils	
	Exercise	

APPENDIX 2. PARTICIPANT LIST

ID	Name	Gender	Designation	Organization	Email
1	Md. Bablu Zzaman	M	Forester	FD	zzaman1978@gmail.com
2	Md. Tariq Aziz	M	Research officer RIMS Unit	FD	tariqaziz9718@gmail.com
3	Asma Islam	F		FD	asmafd1967@gmail.com
4	Shamima Begum Shewli	F	Senior Research Officer, RIMS Unit	FD	to.shewli99@gmail.com
5	Ms. Afroza Begum	F	Research Officer, RIMS Unit	FD	b.afroza@yahoo.com
6	Md. Touhidor Rahaman	F	Forester	FD	tauhidor.rahaman@gmail.com
7	Nazmul Islam	M	GHG consultant	UN-REDD FAO	Nazmul.Islam@fao.org
8	Anatoli Poultouchidou	F	GHG consultant	UN-REDD FAO	Anatoli.Poultouchidou@fao.org
9	Luca Birigazzi	M	National Forest Inventory and GHG expert	FAO	Luca.Birigazzi@fao.org

APPENDIX 3. EVALUATION

		Frequency	Percentage
1	Male	3	43%
	Female	2	29%
2			
	First time	2	29%
	1-3 every year	3	43%
	More than 3 per year	0	0%
	Regularly (approximately one per month)	0	0%
3	**I would describe myself as?**		
	A professor/academic	0	0%
	A student	0	0%
	Forest Department staff	5	71%
	Government staff (outside Forest Department)	0	0%
	NGO staff	0	0%
	Private consultant	0	0%
	Other	0	0%
4	**My professional background relates most closely to:**		
	Forester	2	29%
	GIS/RS	4	57%
	Statistics	0	0%
	Social survey/assessment	0	0%
	Economics	0	0%
	Natural Resource Management	1	14%
	Ecology	1	14%
	other	0	0%
5	**My years of relevant experience is:**		
	1-2 years	0	0%
	3-5 years	2	29%
	5-7 years	2	29%
	8-10 years	0	0%
	More than 10 years	1	14%
6	**The training was relevant to my daily work**		
	Strongly agree	0	0%
	Agree	4	57%
	Neutral	1	14%
	Disagree	0	0%
	Strongly disagree	0	0%
7	**I had enough previous knowledge to understand the content of the event**		
	Strongly agree	1	14%
	Agree	2	29%
	Neutral	1	14%
	Disagree	1	14%
	Strongly disagree	0	0%
8	**The training met my expectations in terms of the content and learning outcomes**		
	Strongly agree	1	14%
	Agree	3	43%

	Neutral	1	14%
	Disagree	0	0%
	Strongly disagree	0	0%
9	**The learning resources provided were adequate and useful**		
	Strongly agree	1	14%
	Agree	3	43%
	Neutral	1	14%
	Disagree	0	0%
	Strongly disagree	0	0%
10	**The resource person presented information in a way that i could understand and was easy to follow**		
	Strongly agree	3	43%
	Agree	2	29%
	Neutral	0	0%
	Disagree	0	0%
	Strongly disagree	0	0%
11	**I feel confident to be able to carry out the tasks described in the training without supervision.**		
	Strongly agree	0	0%
	Agree	4	57%
	Neutral	0	0%
	Disagree	1	14%
	Strongly disagree	0	0%
12	**I was pleased with the venue/meeting room/snacks etc**		
	Strongly agree	2	29%
	Agree	2	29%
	Neutral	1	14%
	Disagree	0	0%
	Strongly disagree	0	0%
13	**Are there other people/agencies/organizations that you think should have been included in the training?**		
	Yes, the NGOs representatives and the environment journalists etc.		
	1 or 2 retired professionals who are expert in natural resource management and ability to learn and accept new techniques.		
14	**Any other comments?**		
	Need a week training		
	For the better understanding the training period should be One week.		