Proceeding of the training workshop on strengthening academic capacities on GHG inventory with a focus on forestry and environmental science

Bangladesh Forest Department

30 March 2017

UN-REDD PROGRAMME

Food and Agriculture Organization of the United Nations

UNDP

UN environment

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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

Bangladesh Forest department and FAO Bangladesh organized a training workshop on "Strengthening academic capacities on GHG inventory – with a particular focus on forestry and environmental science" held at Ban Vaban, Dhaka under the UN-REDD National Programme on 30 March, 2017. The training is organized to know about the current context of the curriculum on disciplines related to GHG inventory (GHG-I) as well as capacity gaps and needs on disciplines related to GHG-I in the universities offering comprehensive forestry and environmental science education. In total, 18 participant (17 male and 1 female) from the Forest Department (FD); Institute of Forestry and Environmental Sciences, University of Chittagong; Department of Forestry & Environmental Science, Shahjalal University; Forestry and Wood technology Discipline, Khulna University; Department of Agroforestry and Environment, Bangabandhu Sheikh Mujibur Rahman Agricultural University; IUCN; Department of Environment (DoE); CDKN, GIZ, and BCAS joined at the training.

As a signatory country of the UNFCCC, to make reliable and accurate GHG-I for different sectors for Bangladesh it is crucial to involve and building capacity of the future decision makers as well as officials of the state agency, along with the existing officials. Some challenges to ensure transparent, consistent and accurate GHG-I reporting are partly associated with the issues, like lack of technical expertise, and sufficient number of qualified experts. Hence, capacity development in academic institutes is crucial to ensure sustainability of the processes.

The country is currently implementing the UN-REDD National Programme. One of the objectives of the national programme is technical capacity building on GHG-I related with land use, land use change and forestry (LULUCF) and AFOLU sector. As a part of capacity development activity of the university offering comprehensive forestry and environmental science discipline, this training workshop was organized.

Four universities, who are offering comprehensive forestry and environmental science education presented the scope and contexts of capacity development programme of GHG-I, in their institute with a particular focus on forestry and environmental sciences. All presentations highlighted curriculum on disciplines related to GHG-I at bachelor and masters levels, and capacity gaps and needs on disciplines related to GHG-I.

Few courses covered topics related with GHG-I in the four universities. Some courses were suggested to incorporate more relevant topic on GHG-I, such as- Watershed, Water Resources and Wetland Management, Forest Mensuration and Inventory, Environmental Pollution and Climate Change, Land Use Planning and Management, Remote Sensing and Geographic Information System, Forest Soil Management, and Forest Soil and Site Productivity.

It is recommended that, in the short term comprehensive training on GHG-I of AFOLU sector should be provided to the relevant and young faculties along with training materials and literature. Moreover, such training should be supported by the development of relevant GHG-I course at the masters level. In the short term and long term, research collaboration between universities and GHG-I state agencies can resulted into capacity building of research and intern students. In the long run, students can be involved with the process through Master's thesis/internship on GHG-I issues. Introducing diploma/certificate course in the long run will also ensure skill man power development on GHG-I issues.

CONTENTS

1. Introduction

Bangladesh is one of the most vulnerable countries worldwide to the negative impacts of climate change. The country needs to develop its institutional competence to transparently report the vulnerability, along with necessary action aimed ensuring greenhouse gas (GHG) emission mitigation. Such action is needed to play a full role in international negotiations on climate change. In order transparently report and implement the mitigation activities, a country should also develop technical capacities related with transparent, consistent and accurate GHG inventory (GHG-I). As a non-Annex I Parties, this country lacks the needed technical capacities and human expertise to fulfil the transparent, consistent, comparable, complete and accurate (TACCC) principle of national GHG-I. The two national communication (NC) submitted so far to the United Nations Framework Convention on Climate Change (UNFCCC) were based on external consultant, rather than the official manpower of the state agency department of environment (DoE). The third national communication (TNC) is also under preparation following the same work modality that means hiring the external consultant. International and national consultants involved with GHG-I preparation tend to hold the ownership of datasets used in the GHG inventory preparation, and often data used for the GHG-I is not properly archived. This type of work modality of national GHG-I preparation is affecting to comply the TACCC principle of GHG reporting. So, the country needs to develop the human resources trained with necessary skills for the preparation of national GHG-I.

The country needs to develop the capacity of the universities, in order to scale up the skilled human resources on GHG-I. According to initial and second national communication 40 to 50% of the national GHG emission emitted from agriculture, forestry, and other land use (AFOLU) sector. Lack of available data as well as human expertise for the transparent reporting and monitoring of GHG is also obvious in this sector, because in the intended nationally determined contribution (INDC) the country specified emission reduction target for the power, industry and transport sector, not for the AFOLU. So, to develop a critical mass of human resources with necessary technical capacity, the country should develop the capacities on AFOLU sector GHG-I of the universities. The technical capacity building and expertise development is critically needed for a transparent, accurate and consistent national AFOLU sector GHG inventory and database. Such technical capacity building and expertise development can be done involving the universities offering comprehensive forestry and environmental science education. Universities offering comprehensive forestry and environmental science education, are already involved with developing human resources and technical expertise on disciplines like ecology, forest inventory and mensuration, agroforestry, environmental science, soil conservation, forest management, crop and nutrient management, watershed management etc. related to AFOLU sector GHG inventory.
The country is currently implementing the UN-REDD National Programme. One of the objectives of the national programme is technical capacity building on GHG-I related with land use, land use change and forestry (LULUCF) and AFOLU sector. In order to scale up the skilled human resources as well as technical expertise on GHG-I of AFOLU and LULUCF sector, FAO in collaboration with the Forest Department, partners and national and international agencies and in accordance with academic institutions involved in forestry and environmental sciences support strengthening academic capacities on GHG-I in particular for the AFOLU sector. Such activity is crucial, because of greater opportunities to build capacity of the future decision makers as well as officials of the state agencies with GHG-I focusing on AFOLU and LULUCF sector.

2. Objectives: training workshop

The objective of the training was to build national capacities on GHG-I with a particular focus on AFOLU sector in the universities offering comprehensive forestry and environmental science education. The specific objectives were:

1. Understand the capacity needs and gaps of universities to conduct a GHG-I based on the IPCC guidelines;

2. Identify and plan activities that can strengthen the capacity of national universities on disciplines relevant to GHG inventory;
3. Strengthen the collaboration between national entities involved in the compilation of GHG inventory.

3. Summary of the presentation and exercise

3.1 GHG-I capacity building activities

The presentation was done by K M Nazmul Islam, UN-REDD National consultant, FAO Bangladesh. The mentioned challenges related with GHG-I on AFOLU sector are lack of technical expertise, lack of capacities, as well as insufficient number of qualified national experts. To overcome this capacity gaps, the needed intervention are the development of skilled human resources, and strengthening capacities in academic institutions to ensure the sustainability of the GHG-I process.

As a capacity development initiative the presenter mentioned about the following training on GHG-I:

(1) GHG-I training conducted on November-2012, June-2015, May-2016, and October-2016. Training workshop on Data sharing, Institutional arrangement and GHG estimation tools conducted on December, 2016. All of the events were organized by the Forest Department and FAO.

(2) Around 15 GHG-I training on General guidance and reporting, Individual sectors: Energy, Industrial process and product use, AFOLU, and Waste; were organized by DoE and EPA for the officials of DoE

(3) Three trainings on Forest Carbon inventory were organized by USAID-funded Climate Resilient Ecosystems and Livelihoods (CREL) on Nov-2013, March-2014, and February-2015. Total 53 participants were from the organization like CNRS, BFD, Winrock International, CODEC, NACOM, Employee of CREL project.

(4) Training EX-ACT carbon estimation tool was conducted on February, 2012.

The capacity building activities by FAO and Forest department on GHG-I focusing on AFOLU sector contributed to the capacity building of 120 participants from around 34 National organization and NGO's. Under the UN-REDD National Programme Forest Department and FAO is planning to implement the following activities:

- Improvement of the exiting curriculum;
- 3 ToT during April, July and September, 2017;
- Forthcoming National Consultation on Data sharing, Institutional arrangement, and GHG emission estimation tools on AFOLU sector;
- Support institutional arrangement for the GHG-I preparation on AFOLU sector;
- Provide support for the development of training materials for the universities;
- Support data sharing and documentation; and
- Support the development of data sharing policies.

3.2 IFESCU

The presentation was done by professor Dr. Md. Danesh Miah, Director, Institute of Forestry and Environmental Sciences, Chittagong University (IFESCU). This institute is the pioneer in forest resource education in Bangladesh, and was established in 1976 with the help of Ministry of Agriculture and Forests of Bangladesh. This institute offers two discipline such as-forestry and environmental science, and offers bachelor, masters, MPhil and PhD degree.

The four year undergraduate program consist of 8 semester with 600 marks and 24 credit in each semester. The undergraduate program consist of 4800 marks and 192 credit in total. In this institute, 1 class hour cover 45 minutes, theoretical courses of 25 marks (1 credit) cover 15 class hours, and practical courses of 25 marks (1 credit) cover 24 class hours. Total credits for the one year masters degree is 32.

Existing courses of undergraduate curriculum of environmental science discipline cover some content on GHG, like Introduction to Environmental Science (ENV 111, first semester), Environmental Pollution (ENV 225, Fourth semester), Air quality management (ENV 326, Sixth semester), and Land use, urban and transport planning (ENV 424, Eighth semester). Similarly, some other courses of environmental science and forestry discipline at masters level cover GHG issues like Environmental Management and Planning (ENV 501), Climate Change (ENV 516), Environmental Modelling (ENV 514), and climate change, REDD+, carbon measurement and Ecosystem Monitoring (FOR 512).

GHG-I issues can be incorporated in future under the courses Geology and soil science (FOR 125, first semester), Aerial Photogrammetry, Remote Sensing and GIS (FOR 223, fourth semester), Forest Mensuration and inventory (FOR 315, fifth semester), Land use planning and management (FOR 424, eighth semester) for undergraduate fforestry discipline. At the masters level forestry discipline courses like Forest soils (FOR 504), Advanced mensuration and computing (FOR 506), and Land use planning and policy (FOR 510) can be targeted to incorporate GHG-I issues. Under environmental science discipline Geology and Soil Science (ENV 125), Aerial Photogrammetry, Remote Sensing and GIS (ENV 223), Environmental Impact Assessment (ENV 421) of bachelor level; and Land use Modelling and Policy Analysis (ENV 508), Environmental Land use planning and Management (ENV 510), and Applied Industrial Ecology (ENV 522) of masters level can be targeted to incorporate GHG-I issues.

Challenges and gaps of this institute are (i) lack of clear idea about different types of emission factors, (ii) Master's students are not familiar with the calculation of emissions and removals of GHG, (iii) GHG inventory issue is not addressed comprehensively, and (iv) non-flexibility of the credits distributed within the courses.

To overcome the existing capacity gap on GHG-I curriculum development needed intervention can be (i) training workshops for the faculties on GHG-I, (ii) Master's thesis on GHG-I issues, (iii) Student's internship on GHG-I process/activities, and (iv) curriculum development.

3.3 KU

The presentation was done by professor Dr. Nazmus Sadath, Director, Forestry and Wood Technology Discipline, Khulna University (KU). This institute is the pioneer in forest resource education in Bangladesh, after the IFESCU, and was established in 1991. The degree offered from this institute are Bachelor of Science (honors) in Forestry, Master of Science in Forestry with major in Forest Management/Social Forestry/Wood Science/Forest Genetics, and PhD.

The vision of this institute is "Education and research for sustainable management of forest resources". To achieve this vision, this institute conducting forestry education encompassing Forest resources of Bangladesh, Forest measurement and assessment, Forest policy, governance and management, Wood science and forest resources utilization, and Forest and climate change adaptation, etc. The strength of this institute are 23

faculty members, with PhD degrees from abroad, as well as well-equipped laboratories and research lab covering major fields of forestry.

Two areas of study of this institute is related with GHG issues, such as Forest Science and Environmental & Earth Science. The forest science cover 73 credit and 29 credit for core and optional course, respectively. The Environmental & Earth Science, cover 8 credit and 9 credit for core and optional course, respectively. The forest science covers 50% of the total credit offered, and Environmental & Earth Science covers 8.3%.

Existing courses of cover some content on climate change, like Fundamentals of Environmental Science (FWT-1211), Forest Mensuration and Inventory (FWT-3107), Environmental Impact Assessment and Management (FWT-3109), Forest Management (FWT-4103), Forest and Environment Policy and Governance (FWT-4201), and Forest and Environmental Laws and Treaties (FWT-4203).

GHG-I issues can be incorporated in future under the courses Fundamentals of Environmental Science (FWT-1211), Forest Ecology (FWT-2101), Soil Conservation & Watershed Management (FWT-2209), Aerial Photogrammetry and Remote Sensing (FWT-2207), Forest Mensuration and Inventory (FWT-3107), Environmental Impact Assessment and Management (FWT-3109), Forest Management (FWT-4103), Forest And Environment Policy and Governance (FWT-4201), and Forest and Environmental Laws and Treaties (FWT-4203).

Suggested intervention to develop the capacity on GHG-I in this institute are (i) new Major in Forest and climate governance is under planning where GHG inventory courses could be incorporated, (ii) an optional masters course on GHG-I including a complete inventory computation on AFOLU sector, (iii) existing course under Forest management major of Master's program can incorporate GHG inventory related issues, (iv) Involving thesis/project student in the GHG inventory process under DoE and FD, (v) Certificate course on GHG inventory can be offered by the university, if there is demand for such professional in related organization, and (vi) Providing training for faculty members regarding GHG inventory.

3.4 SUST

The presentation was done by Professor Dr. A.Z.M. Marzoor Rashid, Chairman, Department of Forestry and Environmental Science, SUST. This institute was established in 1998.

The aims of this institute are to produce graduates who can play important role in the Forestry and Environmental sectors. The four year undergraduate program consist of 8 semester with 160 credits, and 78 courses. The masters program consist of 3 semester, and 36 credits. The strength of this institute are the existence of large nursery to conduct field research, modern equipment for surveying, forest mensuration and inventory, Forest Ecology laboratory, 9 faculty members, who are doing PhD on GHG and climate change related issues, revision of the curriculum in every one year.

Some of the GHG relevant issues like different IPCC reports, biomass and carbon estimation, REDD+, Kyoto Protocol, Carbon trading concept, and drivers of land use changes are discussed in some of the courses, such as- Forest Mensuration and Inventory, Forestry and Climate Change, Environmental Pollution and Climate Change, Environmental Pollution and Climate Change, Land Use Planning and Management, Forest Management, and Remote Sensing & Geographic Information System.

Some of the gaps mentioned are (i) the GIS lab of this department is poorly equipped, (ii) the estimates of GHG derived from land use changes are not included in the current content of the courses, and (iii) Forest Inventory course does not deal with the estimates of GHG emissions except CO_2.

Suggested intervention to develop the capacity on GHG-I in this institute are (i) internship course and research projects on GHG related issues for the students, (ii) Incorporation of new topics in the existing courses, (iii) Development of GHG related course for Master's level students, and (iv) Organizing trainings and workshops for faculties and research students.

3.5 BSMRAU

The presentation was done by Professor Dr. Md. Mizanur Rahman of Bangabandhu Sheikh Mujibur Rahman Agricultural University (BSMRAU). Current curriculum in this institute for different disciplines related to GHG-I at undergraduate programs are AFE 301: Fundamentals of Agroforestry & Environment (3 + 1.5 credit), SSC 401: Soil Conservation, Survey and Classification (3 + 1.5 credit). Current curriculum in this institute for different disciplines related to GHG-I at graduate programs are AFE 521: Environmental Pollution & Protection (3 credit), AFE 611: Climate Change, Agroforestry & Food Security (3 credit), AGR 610: Climate Change & Crop Production (3 credit), and SSC 638: Advanced Soil Fertility (3 credit).

This institute already conducted some research work related to GHG, such as "management practices for carbon sequestration in soil and reducing carbon dioxide emission", and "effect of different organic manures and chemical fertilizers on carbon sequestration in soils under rice-rice cropping pattern". In this institute there exist some laboratories related with climate change, such as- Climate change information and modelling Lab, GHG emission inventory Lab, and Climate change resilience Lab.

This institute also offers six certificate course on climate change and agricultural productivity, such as (i) Basics of Climate Change (3 credit), (ii) Climate Change and Agricultural Processes (3 credit), (iii) Simulation of Ecological Processes (1 + 4.5 credit), (iv) Instruments in Climate Change Studies (2 credit practical), (v) Vulnerability, Mitigation and Adaptation Strategies (3 + 1.5 credit), (vi) Climate Legislation (2 credit).

The strength of this institute are (i) Experienced and well trained multi-disciplinary faculty, (ii) trained faculty members on crop modelling, GIS and Remote Sensing, and (iii) Regular monitoring/evaluation/advisory of the ongoing activities by team of experts. The capacity gaps of this institute are lack of modern instruments needed for carrying out GHG-I, limited Courses on Climate Change–agriculture and Crop Simulation Modelling, regional impact evaluation of Climate Change and climatic variability impact on agriculture.

Challenges to overcome the existing capacity gaps on GHG-I are fixed course model in the undergraduate levels, the students are already overloaded with courses of 254 credit at undergraduate level, possible negative attitude of the students and other faculties of different subjects.

Suggested intervention to develop the capacity on GHG-I in this institute are (i) creation of a new teaching discipline at post graduate levels, (ii) Inclusion of GHG related topic in the existing undergraduate courses, and (iii) Organizing trainings and workshops for faculties.

3.6 Suggestion on GHG-I course development

The presentation was presented by Anatoli Poultouchidou, UN-REDD consultant, FAO Bangladesh. This presentation is based on the background document developed for this training workshop. During the presentation, the courses mentioned in the background documents for the inclusion of new GHG-I relevant topic are presented with the suggested topic. The course are Forest Mensuration and Inventory, Watershed Management, Watershed, Water Resources and Wetland Management, Forest Soil Management, Environmental Pollution & Climate change, Land use Planning and Management, Aerial Photogrammetry, Remote Sensing & GIS, and Agroforestry. A new course at the masters level titled as "GHG inventory for Agriculture, Forestry and Other land use (AFOLU) sector" is presented with a detailed course content.

3.7 Group exercise

The participant were divided into three group. The participant were asked to provide the answer of the following question through interactive discussion within the group:

(1) Please identify short and long term activities to strengthen the academic capacities on GHG-I for the AFOLU sector. Be specific as much as possible.

(2) Please identify challenges to implement the activities identified previously.

(3) Please suggest strategies to implement the identified activities and overcome the challenges.

(4) For the suggested topic for different identified courses in the background document, who would be the national experts you would recommend?

(5) Please list existing materials that can be used/shared to improve training materials related to GHG inventory preparation.

(6) Please provide comments on the background documents.

The outcome of the group exercise is presented in table 1.

Table 1: Outcome of the group exercise.

Group exercise questions	Blue	Green	Yellow
Q-1	1. Following course can be targeted to incorporate GHG-I related issues (Long term) Watershed, Water Resources and Wetland Management, Forest Mensuration and Inventory, Environmental Pollution and Climate Change, Land Use Planning and Management, Remote Sensing and Geographic Information System, Forest Soil Management, Forest Soil and Site Productivity. 2.Training for the relevant and young faculties (Long term). 3. Instrumentation support for the courses relevant with GHG-	1. Introduction of chapters in undergraduate courses (short term). 2. Faculty training (workshop or other) on GHG inventory (short term). 3. Research collaboration (supervision of students) between universities and FD (short term). 4. Master specialisation on GHG emissions and climate change (short term). 5. Introducing diploma/certificate in addition to existing curricula (short term).	1. Short training for targeted Faculty members (5/university)(short term). 2. Same training course (module might be different) for post graduate students preferably research students (short term). 3. Development of course on GHG-I (long term).

	I (Short and Long term).	6. Strengthening laboratory facilities (long term). 7. Provide continuous collaboration and data archiving (long term). 8. Development of resource persons (institutionalisation training capacities for resources person in Universities) (long term). 9. Introducing new courses (long term).	
Q-2	Challenges for the Activity 1: 1. Faculties are not yet developed with GHG-I concept. 2. Lab facilities and recourse materials yet to developed 3. Funding –Initial seed money for research and other activities. Challenges for the Activity 2: 1. ToT needed 2. Funding 3. Lab and working examples using the GHG-I data sets specific to Bangladesh. Challenges for the Activity 3: 1. Fund crisis 2. Skilled human resources.	1. Need to get approval from department. 2. Finance and resource person/selection of target people. 3. Poor coordination among relevant org. common interest in research among org. 4. Limited career opportunity. 5. Authority approval with financing, lack of resource person. 6. Finance and skilled manpower. 7. Lack of data sharing and consistency of data flow among the stakeholders. 8. Accommodation with existing curricula.	1. Unavailability of faculty members to comply with the training schedule. 2. Same problem for the students. 3. Legal issues related to curriculum development, and limitations in incorporating contents or credits.

Q-3	Strategies for the Activity 1: 1. Long and short term training for the faculties. 2. GHG-I issues need to be incorporated in thesis of program. Strategies for the Activity 2: 1. Quality trainings. 2. Donor driven support and university support. 3. Forming a fixed group involving university faculty and govt. Officials on GHG-I. Strategies for the Activity 3: Donor driven support and university support.	It is difficult to suggest strategies within the short time. During the evaluation the participant will provide some strategies.	1. - issues related to travel mode, expenses residential facilities - Find appropriate time to accommodate all institutions (e.g during summer vacations) 2. - To develop human capacities of the teachers who will lead the course - Provision of consultation and finance for organizing workshops and payments for consultants
Q-4	MRV group members can chose the expert during the MRV group meetings.	Will be provided during the evaluation.	Need time to come up with answers on this.
Q-5	Literature will be provided later with the comments on the background document.	Will be provided during the evaluation.	Need time to come up with answers on this.
Q-6	Comments will be provided during the evaluation	Will be provided during the evaluation.	Will be provided during the evaluation.

4. RECOMMENDATIONS FOR NEXT STEPS

- Provide training on GHG-I of AFOLU sector consisting of the content of the suggested course "GHG inventory for Agriculture, Forestry and Other land use (AFOLU) sector" to the relevant and young faculty member.
- Development of training module and workshop proceedings on GHG-I of AFOLU sector.

- Replication of the training through the developed training module and workshop proceedings.
- Development of the course content literature/lecture materials for the suggested course and suggested topic under different courses.
- Creating opportunities for the internship related with GHG-I in the state agencies involved with GHG-I.

APPENDIX 1. AGENDA

Venue: Forest Department		
Thursday 30 March 2017		
	Event	**Speaker**
09.30 – 09.45	Opening remarks	Mr. Rakibul Hassan Mukul
09.45 – 10.15	Capacity building activities on GHG-I for Agriculture Forestry and Other Land Uses (AFOLU) sector	K M Nazmul Islam UN-REDD consultant FAO Bangladesh
10.15 – 10.45	**IFESCU**: - Current context of the curriculum on disciplines related to GHG-I at the bachelor and masters level. - Capacity gaps and needs on disciplines related to GHG-I	Professor Dr. Md. Danesh Miah. Director, Institute of Forestry and Environmental Sciences, Chittagong University (IFESCU).
10.45 – 11.15	**KU** - Current context of the curriculum on disciplines related to GHG-I at the bachelor and masters level. - Capacity gaps and needs on disciplines related to GHG-I	Dr. Nazmus Sadath Md. Raqibul Hasan Siddique Md. Saidur Rahman Forestry and Wood Technology Discipline, KU
11.15-11.45	**SUST** - Current context of the curriculum on disciplines related to GHG-I at the bachelor and masters level. - Capacity gaps and needs on disciplines related to GHG-I	Professor A.Z.M. Marzoor Rashid, PhD Professor Mohammad Belal Uddin, PhD Dr. Mohammed Abu Sayed Arfin Khan Forestry and Environmental Science Department, SUST
11.45-12.00	**BSMRAU** - Current context of the curriculum on disciplines related to GHG-I at the bachelor and masters level. - Capacity gaps and needs on disciplines related to GHG-I	Prof. Dr. Md. Mizanur Rahman Dr. Hasan M. Abdullah BSMRAU
12.00-12.15	Suggestions for integrating components of GHG in curricula of undergraduate and graduate programs	Anatoli UN-REDD consultant FAO Bangladesh
11.45 – 12.30	**Group Exercise** Proposed short and long -term activities that are needed to - Strengthen the capacity of universities on GHG. - Strategies to implement the identified activities.	All

APPENDIX 2. PARTICIPANT LIST

SL No.	Name of Participants		Gender (M/F)	Designation & Organization	Mobile number	E-mail address
01	Dr Md Mizanur Rahman		M	Professor, Department of Agroforestry and Environment, BSMRAU	01710-659303	mizan@bsmrau.edu.bd
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17	Dr Manzoor Rashid		M	Head,Department of Forestry & Environmental Science, SUST	01711-302555	
18	Dr Md Nazmus Sadath		M	Professor, KU	01774-779682	mnsadath@yahoo.com

APPENDIX 3. EVALUATION RESULTS

Training Workshop on GHG Inventory			
1	Gender Distribution	Frequency	Percentage
	Male	6	100%
	Female	0	0%
2	Organization		
	1. Bangabandhu Sheikh Mujibur Rahman Agricultural University 2. Institute of Forestry and Environmental Sciences, University of Chittagong 3. Forestry and Wood Technology, Khulna University 4. Coastal Forest Division, Noakhali, Bangladesh 5. CDKN 6. Shahjalal University of Science and Technology		
3	Have you ever participated in a training workshop on the following subjects?		
	Data sharing on GHG-I	2	33%
	Institutional arrangements on GHG-I	0	0%
	GHG inventory preparation	0	0%
4	How relevant is for your organization to develop capacity building on GHG-I?		
	Not relevant	0	0%
	Slightly relevant	0	0%
	Relevant	1	17%
	Most relevant	5	83%
5	What is the vision of your organization related to the preparation of a national GHG-I for the AFOLU sector?		
	1. Research on GHG-I to mitigate global warming and climate change 2. As the nature of our Institute, we have the commitment to take part in the GHG mitigation. Hence, we need to develop our capacity on GHG-I. 3. Education and research for saving and expanding our scarce forest resources ensuring its sustainable development and conservation 4. My organization always values for preparing a national GHG-I for the AFOLU sector. 5. To provide academic and field training to students for GHG-I		
6	The training workshop leaflets, presentation and background document provided were adequate and useful.		
	Strongly agree	3	50%
	Agree	3	50%
	Neutral	0	0%
	Disagree	0	0%
	Strongly disagree	0	0%
7	The resource person presented information in a way that I could understand and was easy to follow.		
	Strongly agree	3	50%
	Agree	3	50%
	Neutral	0	0%
	Disagree	0	0%
	Strongly disagree	0	0%

8	What would you recommend as next steps to increase the capacity of the universities on GHG-I offering comprehensive forestry and environmental science degree?		
	1. Involve all stakeholders of AFOLU sector in developing comprehensive courses for Forestry and Environmental Science 2. To undertake training program on GHG-I. 3. Effective training to the faculties and and make collaboration among the related disciplines and organization 4. Requested to short course 5. I would like to recommend to the universities to introduce this issue at least as a part of a course. 6. Provide training to the faculties, provide lab support for GHG-I, Provide literature and supporting documents related to GHG-I		
9	What do you think would be the main challenges to increase the capacity of universities on GHG?		
	1. Accommodate new courses on GHG in the existing fixed model and heavily loaded undergraduate course curricula Bottlenecks in the training program. 2. Taking adequate time to receive the training. 3. Identify the target people who are motivated to work in this sector. 4. need training for all sector 5. After attending the workshop, I felt that the pressure of existing courses in the universities is the main challenge. 6. Consistent Follow-up		
10	Please list existing materials that can be used/shared to improve training materials related to GHG inventory preparation.		
	1. Rahman et al., 2016. Effect of organic and inorganic fertilizers and rice straw on carbon sequestration and soil fertility under rice-rice cropping pattern. Carbon Management, 7(1-2), 41-53. and Rahman, 2013. Carbon dioxide emission from soil. Agricultural Research, 2(2):132â€“139. and many other published materiALS available in the net. 2. 2006 IPCC Guidelines for National Greenhouse Gas Inventories. Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories. IPCC Emissions Factor Database. 3. Krisnawati, H., Imanuddin, R., Adinugroho, W. C., & Hutabarat, S. (2015). Standard Methods for Estimating Greenhouse Gas Emissions from the Forestry Sector in Indonesia (Version 1). Research and Development Center for Conservation and Rehabilitation, Forestry Research and Development Agency, Bogor, Indonesia. 4. Hooijer, A., Page, S., Navratil, P., Vernimmen, R., van der Vat, M., Tansey, K., ... & Mawdsley, N. (2014). Carbon emissions from drained and degraded peatland in Indonesia and emission factors for measurement, reporting and verification (MRV) of peatland greenhouse gas emissionsâ€'a summary of KFCP research results for practitioners. IAFCP, Jakarta. 5. Provide Book, leaflet etc. 6. Literature		
11	Please provide comments on the background documents.		

	1. Still scopes are there for further improvement. 2. These are useful. 3. For Khulna University. 3.2.1 Forest Mensuration and Inventory. Basic about GHG can be incorporated in Introduction to Forestry in 1st year 1st term or Fundamentals of Environmental science in the 2nd term. 3.2.3 In sessional we can develop materials and demonstration session to quantify biomass/carbon from forest or other land use through remote sensing image. For this we need high resolution image and inventory data for validation. In masters it is dire need to introduce one major with climate change where we can accommodate all sorts of things related to GHG and REDD+. The rest is ok for me. 4. it is necessary and agree 5. Backgrounds notes were relevant and very much helpful. 6. ok		
12	Which message would you like to bring to the policy makers to improve the capacity of GHG-I preparation on AFOLU sector of the universities offering comprehensive forestry and environmental science degree?		
	1. Modernization of laboratories with equipments needed for GHG-I, Skilled manpower development through abroad and local training, Launch independent degree program in the postgraduate level. 2. Capacity on GHG-I of the AFOLU sector is critical to the compliance of International treaty. This should be one of the important topics in the Forestry and Environmental science degree. 3. The university/faculty/research group should incorporate a particular research theme. Ongoing climate discourses could be accomodate into these research themes. More important is to share data and enhance collaboration among universities and organizations. 4. Include GHG-I in Curricula		
13	Any other comment?		
	1. DoE and FD should monitor regularly to nurture the skilled person and provide projects or funds who will work in GHG emission sector.		