Proceedings of the training of trainers for the Bangladesh Forest Inventory

Bangladesh Forest Department
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The Forest Department of Bangladesh leads actions to improve forest management and conservation, adopting forward thinking, innovative approaches in its management of approximately 1.55 million hectares of land across the country.

In 2015, the Forest Department began a process to establish a National Forest Inventory and Satellite Land Monitoring System for improved forest and natural resource management. The process supports national objectives related to climate change mitigation and provides information in support of the UN-REDD programme aimed at Reducing Emissions from Deforestation and Forest Degradation (REDD+). The process also addresses domestic information needs and supports national policy processes related to forests and the multitude of interconnected human and environmental systems that forests support.

The activities implemented under the Bangladesh Forest Inventory process are collaboration between several national and international institutions and stakeholders. National partners from multiple government departments and agencies assist in providing a nationally coordinated approach to land management. International partners, including the United Stated Agency for International Development (USAID) and the Food and Agriculture Organization of the United Nations (FAO) are supporting the development of technical and financial resources that will assist in institutionalizing the process.

The results will allow the Forest Department to provide regular, updated information about the status of trees and forests for a multitude of purposes including for assessment of role of trees for firewood, medicines, timber, and climate change mitigation.

CONTACTS:

Md. Zaheer Iqbal
National Project Coordinator
Bangladesh Forest Department
Email: z.iqbal60@gmail.com

Matieu Henry
Chief Technical Advisor
Food & Agriculture Organization of The United Nations
Email: matieu.henry@fao.org

EXECUTIVE SUMMARY

For Bangladesh National Forest Inventory (BFI) a team of experts are necessary; who are responsible for successful implementation of NFI. They should have clear concept about the use of the instruments for data collection and forms going to be used for data recording. Before start training of field crews quality of the trainers as well as QA/QC team members involved, should be ensured through training. These are the purposes that, a training program for trainers was designed and implemented. In total number of participants/future trainers were 24 and resource persons were 7 in the Training of the Trainers (TOT) program (29 male and 2 female).

The training started in 2nd September, 2016 in the Ban Bhaban auditorium with inaugural session. From the next day Bangladesh National Herbarium (BNH) and Botanical Garden were used as training places. In case of presentations or lectures herbarium was used and for field work participants were moved to Botanical garden. Silva Carbon provided the technical support in the training. Participants are mostly from Forest Department and Universities.

Different experts and resource persons from home and abroad were present in the training to solve every difficulty of the future trainers. Lots of presentations, discussions, field practices, experience sharing, questions, corrections etc. and so on were done to develop the expertise in inventory of the future trainers. After completing 7 days training the new trainers are now ready to provide training to the field crews. Alongside with that many confusions related with BFI are fixed, corrections and recommendations were made to improve the program, interactions were created with different personnel and overall everyone was motivated to complete BFI successfully.

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3. Background

The national forest inventory design is explained in the BFI design document {Iqbal, 2016 #636}. The methodology for the Bangladesh Forest Inventory is explained in Field Instructions for the National Inventory of Bangladesh prepared with support from USFS/ SilvaCarbon and FAO {Hayden, 2016 #880}. The manual explains field personnel in how to locate and measure field plots and document the field procedures, methods, and codes used in the inventory. It is complemented by other manuals for the Land Cover Classification System (LCCS) (Jalal, Iqbal et al. 2016), the manual for the use of the GPS (Costello and Sultana 2015), the manual for the soil component under preparation by SRDI (In prep).

Quantification of forest ecosystem services and the socioeconomic value of forest and trees are poorly known and/or valorized. Investment in the transformation and valorization of forestry product is very limited while the demand is continuously increasing. The persistent widening gap between demand and supply is being filled by importation. Owing to lack of well-timed planning and skill manpower the forest inventory has become irregular and losing its importance.

FAO of the United Nations is implementing the project titled "Strengthening National Forest Inventory and Satellite Land Monitoring System in Support of REDD+ in Bangladesh" with the financial support from USAID, and technical support from SilvaCarbon Bangladesh to support the Bangladesh Forest Department in initiating the second National Forest Inventory.

Approximately 100 people need to be trained to carry out NFI activities. In March 2016, a first phase of training was carried out when 14 Forest Department officials were trained on Quality Assurance/Quality Control (QA/QC) for the inventory, covering three forest ecosystems, deciduous Sal forest in Gazipur, Sundarban Mangrove forest in Khulna and Hill forests in Cox's Bazar. In October, a second and final phase of training will take place. The process for implementing the second phase of training will consist of two parts:

1. **A Training of Trainers program:** The team of trainers implementing this activity need to be well prepared to ensure knowledge is effective transferred. To achieve this aim a rigorous training of trainers (ToT) activity is required.

2. **Full training with approximately 100 BFI staff**: Prior to start the operation of field data collection the field teams will be trained in the various components of forest inventory to ensure they can carry out the work efficiently and accurately. Field teams are of three categories: Field Crews, QA/QC Teams and Supervisors.

National Forest Inventory (NFI) is a tough job including the most depth survey with an extensive and unique record of key information about forests, land use and other attributes of different ecosystems of Bangladesh. The large number of crews, who are going to conduct this duties, are needed to be trained up very effectively, because the ultimate success of Bangladesh National Forest Inventory (BFI) depending on their clear perception about program objectives, effectiveness on the field during data collection and expertise on data recording. In BFI program a very important role is going to be played by the quality control

and quality assurance (QA & QC) team members because they will ensure the quality of data recorded from the field. Some QA/QC members are also in panel of the trainers of the field crews. No doubt that train up of the field crews is a tough job to be done properly, so at first the trainers have to prepare themselves at their best through receiving training.

To develop expertise of the future trainers Bangladesh Forest Department and FAO with the support of Silvacarbon arranged a training program for the trainers (ToT).

4. Objectives

The general objective of the training (TOT) program is to develop expertise of the future trainers. The specific objectives are-

> ➢ Establish an effective, well prepared team of trainers;

> ➢ Facilitate training for BFI field crews on topics related to field inventory, soil sampling and botany
> ➢ Refine training methods to ensure smooth delivery.

5. Overview of the TOT

The training of trainers was organised in 10 sessions divided into 7 days. It started in the 2nd October, 2016 and ended in 8th October, 2016. Here all sessions activities including inaugural session are shortly overviewed-

5.1 Session 1: Through inaugural session Training of the Trainers (TOT) started in which, Md. Mozarul Islam (DCCF) gave the welcome remarks. Following that Mr Matieu Henry (FAO) briefly described the concept and principle of this National Forest Inventory program. Mr Zaheer Iqbal (BFD) and Laskar Rahman (FAO) deliberated their presentations as well to describe BFI design and team composition. Lastly the Chief Guest Mohammed Shafiul Alam Chowdhury (DCCF) gave his concluding speech to end the session.

5.2 Session 2: after launch break first technical session of TOT started with Mr Rashed Jalal (FAO) presentation, describing the validation of land cover map through integration of inventory data and remote sensing image. Heather Hayden (USFS) presented the BFI field manual and in association with her Mr. Zaheer Iqbal (BFD) gave a presentation on Quality assurance and quality control manual. Lastly on that session 3 different universities presented their experience of field testing. Probable way of working in the field, hurdles, solutions and recommendations were reached to the participants.

5.3 Session 3: In Bangladesh National Herbarium on the second day of the training 3rd session started in the morning. Dr. Mahmood Hossain (KU) described different measurement procedures and data collection processes. Later on Mr Zhaeer Iqbal (FD) along with others described the administrative, communicative and social perspectives of field plot

measurements. Operations of different field equipment like- Diameter tape, GRS Densometer, Leaser Range Finder, Shuunto Clinometer, Compass etc. with their maintenance are clearly described by Heather Hayden (USFS). This practical show up helped the participants a lot to learn the use of the instruments. Again Mr Zaheer Iqbal (FD) illustrated the use of GPS on the field operations. Mr Sourav Das (SUST) and Liam Costello (FAO) showed how to locate field plots and sub plots. Some field practices took place in the late afternoon.

5.4 Session 4: This session started with the learning of Open foris application in practical, which is an android operated application. Mr Liam Costello (FAO) showed the process of data recording to the participants through this application and using tablets in the field. The experts and participants agreed that hard copy of data through field forms should also be collected to avoid risk of data loss and as back up source. Heather Hayden (USFS) explained how to use the field forms. Mr Sourav Das (SUST) described to the participants about plot data collection system and different disturbances or hurdles that can be faced on the field. Land features were presented by Rashed Jalal (FAO); lots of crucial points of confusions ware raised and long discussion took over those points to make them clear. Mr Matieu Henry (FAO) and other experts along with the resource persons tried to solve the quarries and settle some solutions.

5.5 Session 5: In the afternoon session of 04/10/2016 Heather Hayden (USFS) described the procedure of subplot data collection likes- characteristics, witness objects selection etc. The participants engaged themselves into the field activity. In the last of the session Dr. Mahmood Hossain (KU) delivered his presentation on tree and sapling measurement. He made the process of tree and sapling measurement clear to the participants also he illustrated how to use rangefinder/hypsometer, diameter tape, clinometer etc. to serve this purpose.

5.6 Session 6: How to take measurements and record data for bamboo, based on that topic a smart presentation was delivered by Mr Sourav Das (SUST). In his presentation he showed the difficulties of bamboo measurement and how to overcome them. Some clear considerations are made from the presentation and discussion, like-

- ✓ In case of bamboo it should be length not height,
- ✓ Slope distance should be the horizontal distance,
- ✓ For height measurement the mostly represented individual of the population should be considered etc.

Frida Siddik (FAO) presented the measurement and difficulties of wood debris, litter and soil (Texture, Carbon and Bulk Density) at the end of the session.

5.7 Session 7: after launch break lead by Dr. Frida Siddik (FAO) a session was held to provide a clear concept, guideline and field experience on measurements of wood debris, litter and soil. Types and classification of debris, how to collect and measure them in the field, soil measurement instruments and using process of them etc. described properly in the session. With varying forest type the processes of soil sample collections are also different, like-

✓ In Mangrove forest a soil Aguer of 100cm will be used but in Hill forest and Sal forest 30cm Auger will be used.

Other clarification also made regarding the use soil core sampler. Collection process of soil sample to analyse different attributes of soil are different. This session was a practical session, so all participants got the opportunity to make their concept clear from the session.

5.8 Session 8: The 5th day of training started with a presentation by Dr Sardar Nasir Uddin (BNH) entitled "Specimen collection – botanical identification". This presentation is based on how to collect unknown species specimen to identify them in scientific way. Importance of specimen collection and a new developing application for species identification also discussed and showed by him. After the presentation some discussion over land features and problems faced previous day during field work were took place. Then participants went to the field and tried to collect and record data as like in actual field. But they faced some problems like-

✓ Identification of plot and sub-plot location,
✓ Problems with land feature and land feature object selection,
✓ Inconsistency of hand copy data form with open foris,
✓ Some technical problem with handling of the tab etc.

Through this session they became familiar and to some extent got the real position of field. Mr Matieu Henry, Heather Hayden, Frida Siddik, Liam Costello visited every group during the field work.

5.9 Session 9: In seventh October all participants spent their whole day in the field to learn field activities properly. They were divided into four groups and practised field data collection and data recording as like the previous day. Collection of soil sample and processing of the samples were done by them under the guidance of Frida Siddik (FAO). The participants developed their expertise of using different instruments in the field and select layout of the plot. The got the chance to clear their confusions faced by them yesterday in the field. After that in the lead of Heather Hayden (USFS) some practice took place focusing slope calculation and hot check in the field. Several questions and confusions arise during the whole field session and the experts along with the resource persons solved the quarries.

5.10 Session 10: 8th October, 2016 was the last day of TOT. The day started with the presentation of Mr Gael Sola (FAO); showing the layout, design, accessibility and so on. He recommended some changes based on overall TOT. Some other land features and land objective considerations are also discussed. Over the discussion decisions were made about accessibility options. Heather Hayden (USFS) showed some of quality control and quality assurance issues, she also showed how to use excel sheets by the QA/QC team to ensure the quality. Then Mr Imran Ahmed (FD) presented another power point presentation, through which he shared his work experiences of the Sundarbans. He indicated the hurdles, possible solution and their work in the mangroves. Basis on how to organize the field work, discussion started headed by Mr Luca Birigazzi (FAO) and a probable layout of team work as well as field work distribution within the team members were discussed. In the concluding remarks Mr Laskar Muqsudur Rahman requested everyone to do their best to make this inventory successful. He showed his gratitude to Bangladesh Forest Department, UNREDD+, Silva Carbon, USAID and FAO. Finally he thanked all participants for joining this program.

6. Clarifications and Decisions made based on Group Discussion

Lots of discussions about confusions and different judgements were took place in almost every session of TOT. Land feature was the issue what made the participants most confused

than others. Some clarifications are made to make the land feature selection issues simple, like-

- If more than one distinct land features are present in a plot, then all of them will be indicated as percentage basis.
- Land feature area size will be assumed by ocular estimation.
- One land feature may have contained of several land feature objects. Land feature should be described from the plot center.
- If there is only one land feature then in land feature mapping it should be written- all in one.
- If any part of a plot is not accessible due to permission or some other problems, it will not change the land features but the plot will be described as partially accessible.

Over the discussion several changes were proposed for data recording forms, later on some were updated into the from like-

- ✓ Only two options for water salinity (freshwater and saline water) are proposed.
- ✓ Reserve status of forest should be changed into legal status
- ✓ Illicit felling should be removed from the treatment options.
- ✓ In some cases it is not possible to know the rotation of trees, so one option named unknown should be added in rotation section.

7. Conclusion

This training program was helpful to develop expertise of future trainers, who are going to train the field crews of BFI in the November, 2016. Despite of some difficulties the participants showed lots of interest in learning as well as the experts also tried their best in teaching. Without any doubt they future trainers are in better position now than before the TOT in case of both knowledge and experience. Some recommendations also came and clarification made which are really helped to modify the BFI manuals, field forms and open foris application.

8. Overall Comments for further Activities

The training program completed successfully without any big issue. The participants are ready to provide training to the field crews and they are also ready for Quality control and Quality assurance activities too. Despite of all progress some overall recommendations are delivered by all participates of the TOT. Some majors of them are-

- ✓ Provide short term refreshment training to the trainers before the start their training to the field crews.

- ✓ Finalize the field manual and data form according to the recommendations made during the TOT.
- ✓ Field crews training is a large program so to provide all revised documents in proper time.
- ✓ If possible increase 1-2 field crews specially university graduates.
- ✓ Provide internet support in the field where possible.

9. References

Costello, L., & Sultana, R. (2015). Global Positioning System: A Practical manual for field GPS use. In FAO & SilvaCarbon (Eds.), (pp. 35). Dhaka.

Jalal, R., Iqbal, Z., Islam, S., Abed, M., Abul, H., Akhter, M., Hudson, A. (2016). Land Cover and Forest Monitoring in Bangladesh - Methodological Approach. Retrieved from Dhaka.

Appendix 1: Agenda for the Training of Trainers

2-Oct	FD Conference Room	Lead	Notes
9:30 (sharp)	Welcome remarks by the UN-REDD focal point	Md Mozarul Islam (DCCF)	
9:35	Concepts and principles for a multi-purposes forest inventory	Matieu Henry (FAO)	Presentation on integrating field inventory and remote sensing for different purposes
10:00	Objectives of the Bangladesh Forest Inventory and Bangladesh Forest Inventory design	Zaheer Iqbal (BFD)	Presentation of the BFI design
10:30	BFI operationalization: roles and responsibilities	Laskar Rahman (FAO)	Presentation of the team composition, roles, responsibilities and TORs
11:00	Welcome remarks by the chief guest	Chief Guest Mohammed Shafiul Alam Chowdhury (DCCF)	
11:05	Break and picture		
11:30	Integration of field inventory data and remote sensing, status of the Art of the Land Cover/use classification system of Bangladesh	Rashed Jalal (FAO)	Presentation on the national reference system and the field data collection to support the validation of the land cover map and the information system
12:00			
13:00	Presentation of the manual and the different components: an overview	Heather Hayden (USFS)	Presentation of the BFI field manual
14:00	Presentation of the Quality assurance and quality control manual	Zaheer Iqbal (BFD) / Heather Hayden (USFS)	Presentation of the QA/QC process
15:00	Field experience: lessons learnt	Mahmood Hossain (Khulna	Joint presentation on the lessons learnt from the field experiences and recommendations for

Date	Topic	Presenter	Description
		University)/ Mohammad Main Uddin (IFESCU)/ Sourav Das (SUST)	implementation
3-Oct	**Botanical Garden**		
	Introduction (section 1 of the manual)	Dr Mahmood (KU)	Presentation of units to measure, the different steps for data collection, general description of the plot design and shape, where to record trees.
	Travel planning and locating the plot: how to obtain permission, how to communicate to local people, how to be introduced, how to behave in the field, list of contacts and communication between teams (section 2 of the manual)	Zhaeer Iqbal (FD), Laskar Rahman (FAO), Ruhul Mohaimen (CREL)	How to plan travel, obtain permission and communicate with people to ensure the appropriate implementation of field measurements.
	Review and operation of field equipment and maintenance (section 6)	Heather Hayden (USFS)	Presentation of the different equipment tools and how to ensure the maintenance and proper use.
	Use of GPS (section 6)	Zaheer Iqbal (FD)	How to use a GPS
	Locating the plot on the ground, plot layout and referencing section 3 of the manual)	Sourav Das (SUST), Liam Costello (FAO), Gael Sola (FAO)	Presentation on locating the plot, the sub-plot, plot and sub-plot shape, reference points and monumentation of the plot, slope measurement
	Lunch break		
	Field Exercises		
4-Oct	**Botanical Garden**		

	Use of Open Foris and tablets	Liam Costello (FAO)	Including basic functions of the tables
	Filling in the field forms	Heather Hayden (USFS)	Explanation on how to use the field forms
	Plot data collection : time, date, names, location, GPS, RP (section 7)	Sourav Das (SUST)	Forest types, owner group, types of disturbances etc.
	Land features (section 8)	Rashed Jalal (FAO)	Presentation on the methodology to collect the necessary data to be used for the classification system, measurement of crown cover, leaf cover. How to use the GRS densitometer., how to fill the plot cards
	Subplot data collection: characteristics, WO (section 9)	Heather Hayden (USFS)	Which are the subplot characteristics and how to identify witness objects
	Tree and sapling (section 10)	Dr Mahmood (KU)	Presentation on tree record number, tree tags, standing tree diameter and tree height, how to use rangefinder/hypsometer, diameter tape, clinometer etc.
	Bamboo (section 11)	Sourav Das (SUST)	Presentation on how to measure bamboos
	Seedling (section 12)	Main Uddin (IFESCU)	Presentation on the seedling measurements
	Shrubs (section 13)	Dr Mahmood (KU)	Presentation on the measurements for the shrubs
	Lunch break		
	Exercise		
5-Oct	Botanical Garden		
	Measurement of wood debris	Frida Siddik (FAO)	Presentation on measurement of down wood materials

	Litter and soil	Frida Siddik (FAO)	Presentation on how to differentiate different soil types, including mangrove soils, how to use the different augers, bulk density measurement etc.
	Specimen collection – botanical identification	Dr Nasir (BNH)	Presentation on how to collect plant specimen for their identification
	Lunch break		
	Exercise		
6-Oct	Botanical Garden		
	Relocating a plot	Heather Hayden (USFS)	Presentation on how to find an already measured plot and perform the QA/QC tasks
	Exercise: measurement of one plot (4 teams, 4 plots)	4 groups	
7-Oct	Botanical Garden or FD Conference Room		
	Data submission procedure	Liam Costello (FAO)	Explaination on how to submit the
	Revision of the manual and training materials (all together then in small groups)	Zaheer Iqbal (BFD)	Revision of the training materials with the participants involved
	Preparation: checklist	Sourav Das (SUST)	Revision of the training materials with the participants involved
	Revision of the training materials	By groups	Revision of the training materials with the participants involved
	Revision of the QA/QC manual	By groups	Revision of the manual
	Logistics – how field teams should be organized	By groups	
	Presentations by groups	All	

8-Oct	Botanical Garden or FD Conference Room		
	Final review of the documents	All	
	Final field testing	All	
	Evaluation	All	
	Conclusion		
	Closure remarks	Zaheer Iqbal (BFD)	

Appendix 2: Participants List of the Training of Trainers

Sl.no.	Name	Designation	Organization	Contact Number	Email
1	Matieu Henry	CTA	FAO		Matieu.Henry@fao.org
2	Heather Hayden		USFS		hhayden@fs.fed.us
3	Luca Birigazzi		FAO		Luca.Birigazzi@fao.org
4	Gael Sola		FAO		Gael.Sola@fao.org
6	Frida Sidik		FAO		
7	Liam Costello	Project Officer	FAO		Liam.Costello@fao.org
8	Rukshana Sultana	Country Coordinator	Silvacarbon	01735442679	
9	Ruhul Mohaimen Chowdhury	Programme Specialist	CREL	01726892305	
10	Laskar Muqsudur Rahman		FAO	01732998449	Laskar.Rahman@fao.org
11	Rashed Jalal	RS and GIS Consultant	FAO	01723383854	Rashed.Jalal@fao.org
13	Sarder Nasir Uddin	Principal Scientific Officer	BNH	01914007503	
14	Mariam Akhter	Forestry Officer	FAO	01711170697	Mariam.Akhter@fao.org
17	Mr. Md. Salahuddin	DFO, CHT South Division	FD	01712263767	dfochts@gmail.com
18	Mr. Imran Ahmed	DFO, SFD, Rajshahi	FD	01761494600	imranahmed@live.com
19	Mr. Yasin Newaz	Director FSTI, Chittagong	FD	01711447161	newaz.yasin@gmail.com
20	Mr. Matlubur Rahman	ACF, Chittagong South Forest Division	FD	01712627900	mrahman10169@gmail.com
21	Mr. Abu Bakar Siddique	ACF, Ctg North Forest Division	FD	01718848759	abakeracf@gmail.com
22	Baktiar Nur Siddiquie	DFO, Dhaka	FD	01711819670	baktiar1971@gmail.com
23	Hossain Md. Nishad	DFO, Dhaka Social	FD	01715005677	hmnishad@gmail.com
24	Zaheer Iqbal	DCF, RIMS	FD	01711443750	z.iqbal60@gmail.com
25	Mr. Belayet Hossen	ACF, Cox'sbazar South Forest	FD	01712984500	belayet.hossen70@yahoo.com

		Division			
26	Dr Mahmood Hossain	Professor	KU	01711959380	mahmoodhossain@hotmail.com
28	M. Main Uddin	Assistant Professor	IFESCU	01991946688	main@cu.ac.bd
29	Manzoor Rashid	Professor	SUST	01711302555	pollen-forest@yahoo.com
30	Sourav Das	Assistant Professor	SUST	01711348630	souravdron@gmail.com
31	Mondal Falgoonee Kumar	NFI-Intern	FAO	01746940642	Mondal.FalgooneeKumar@fao.org