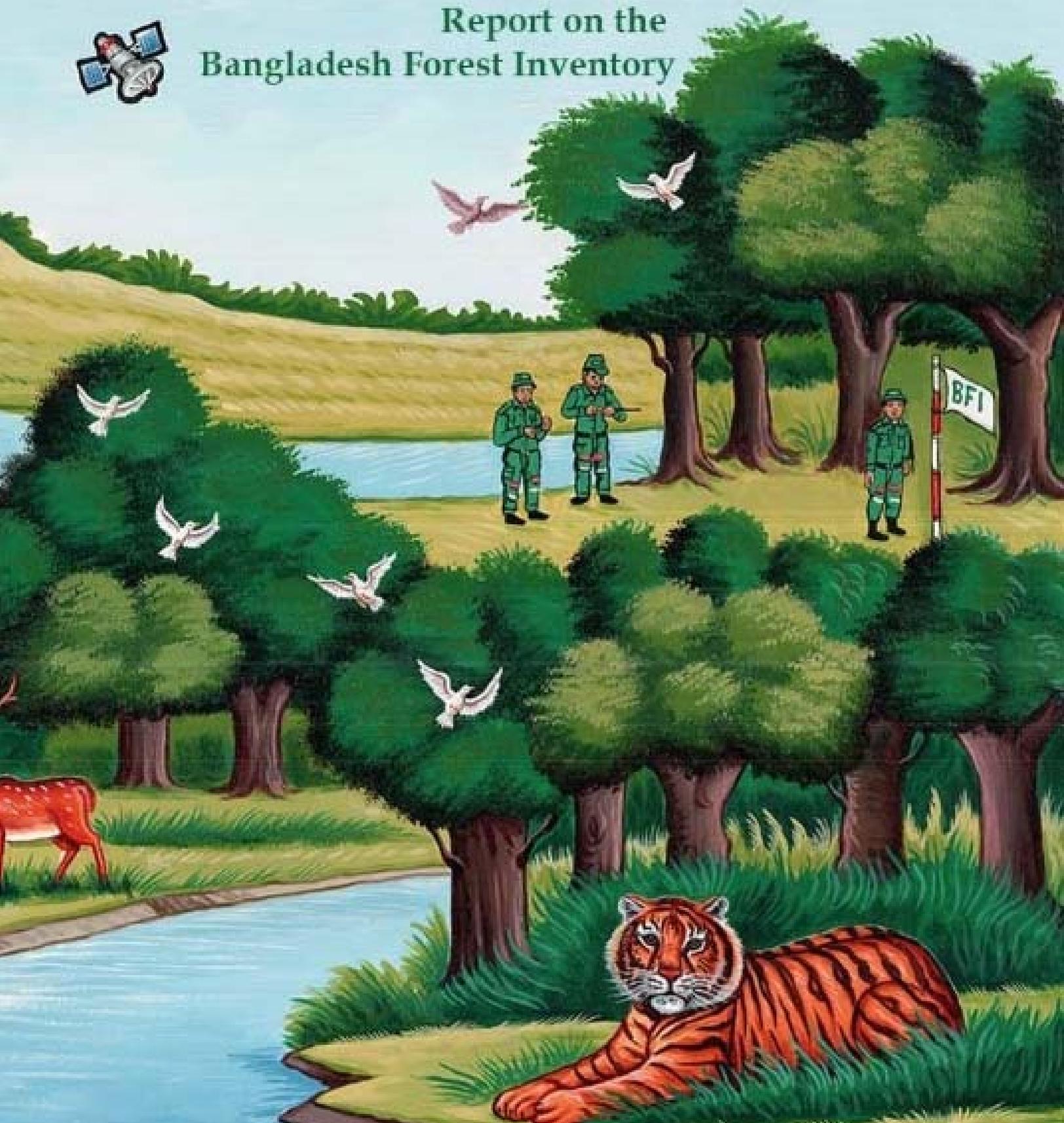






# Tree and Forest Resources of Bangladesh

## Report on the Bangladesh Forest Inventory





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Photo: Mangrove forest, The Sundarbans, ©FD





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# Foreword



The entire world is looking at forest ecosystems for providing solutions to the adverse impacts of climate change and ensuring the ecological security of the world. Forest ecosystems are dynamic in nature and so require regular monitoring of changes in order to ensure balance between its conservation and development. It gives me great pleasure to note that Bangladesh Forest Department has fulfilled this national need by carrying out first cycle of the inventory from 2015 to 2019 through the project “Strengthening National Forest Inventory and Satellite Land Monitoring System in support of REDD+ in Bangladesh” technically supported by Food and Agriculture Organization of the United Nations (FAO) and financially assisted by the United Agency for International Development (USAID).

This National Forest Inventory has provided qualitative and quantitative information at the national level, including information on forest growing stock, carbon accounting and other forestry parameters which are not only important to forestry professionals but also to policy makers, planners, researchers, academicians, non-government organizations, community based organizations, etc. having interest in the conservation of forest resources. All these forestry statistics have provided us with a comprehensive picture of our forest resources that allows us to understand these resources and to inform national plans and strategies for balancing sustainable development with natural resource conservation, in particular the Sustainable Development Goal 15 - Life on Land.

I am delighted to note that Bangladesh Forest Department has proved its professional competence in the assessment of forest resources as well as forest cover mapping by using satellite-based land monitoring system, the concept of which is in accordance with the Hon’ble Prime Minister’s vision of “Digital Bangladesh”. I hope that Forest Department will continue to strive making use of advanced remote sensing-based technologies consistent with changing times to provide more comprehensive information for sustainable management of forest resources in the country. I am confident that Bangladesh Forest Department will be able to pursue periodic forest inventory to monitor the changes in our forest resources for sustainable utilization without compromising our effort on conservation.

I am happy to note that this inventory has included trees outside the forest which are major sources of meeting the local demands of timber, fuel wood and fodder. The forest statistics and other information produced by this National Forest Inventory will be widely used in forest policy making, forest management planning, planning of forest industry investments, assessing sustainability of forestry, evaluation of greenhouse gas emissions and changes in carbon storage and research. Moreover, this assessment will make significant contribution towards international commitments by reporting and complying various requirements under Global Forest Resource Assessment, REDD+, UNFCCC, UNCCD, CBD etc.

I am thankful to the USAID and FAO for their continued assistance and support. I express my deep appreciation to the Chief Conservator of Forests and his team for engaging in this endeavour, and for their dedicated efforts, devotion and hard work in successfully completing the inventory to bring about this highly useful and informative report. My hope is this effort will provide the robust information to decision makers for sustainable forest management and conservation in the country.

**Md. Shahab Uddin, MP**

Minister

Ministry of Environment, Forest and Climate Change



National forest inventories have gained global importance and momentum with countries striving to monitor their forest resources with the intention to generate reliable estimates of the country's tree and forest resources, which will have a long-term impact on improving the management, conservation and benefits from trees and forests. Reliable and up-to-date information on the state of forest resources is crucial for supporting policy formulation, strategic planning, financial investment and sustainable forest management. To generate this information, Bangladesh Forest Department under the Ministry of Environment, Forest and Climate Change implemented the project "Strengthening National Forest Inventory and Satellite Land Monitoring System in support of REDD+ in Bangladesh" from 2015 to 2019 with financial support from the USAID and technical support from the FAO of the United Nations. The resulting Bangladesh Forest Inventory (BFI) is a key contribution to the Measurement, Reporting and Verification (MRV) component of the REDD+ mechanism (reducing emissions from deforestation and forest degradation, conservation of existing forest carbon stocks, sustainable forest management and enhancement of forest carbon stocks).

I am delighted to note that the Bangladesh Forest Department successfully applied the latest remote sensing technologies to lead the comprehensive National Forest Monitoring in the country through a dedicated set of forestry professionals. I am confident that the forestry professionals have been able to enhance their capacities in forest resource assessment and so be able to implement forest resource assessments in future.

The successful completion of BFI and the publication of this report is a testimony to our commitment to the management and conservation of the country's forest resources. It is impressive to look at the contributions of various professionals involved with the implementation of the project and preparation of this report, which provides us with an updated understanding of national tree and forest resources. I am thankful to the FAO of the United Nations for providing technical support and to the USAID for financial assistance to implement the BFI project.

Finally, I would like to record my sincere appreciation, in general, to the Forest Department and in particular, to the BFI team and all the stakeholders contributing to the successful and commendable achievement of the project. I hope the information disseminated by this report will be utilized in full extent to all decision makers, planners, academicians, students and other professionals working in the field of natural resource management.

*Habibun Nahar*

**Habibun Nahar**  
Deputy Minister  
Ministry of Environment, Forest and Climate Change



One of the core missions of the Ministry of Environment, Forest and Climate Change (MoEFCC) is to ensure sustainable management of forests through the conservation of ecosystems and biodiversity helpful for addressing climate change. At the same time, it seeks to develop forest resources and recognize the socio-economic contribution and community dependence on trees and forests. As the country continues to experience both economic and population growth, it is critically important to have a national forest monitoring system which captures the impacts of expanding industries and other activities for livelihoods on natural resources.

The data collected from national forest inventory is useful to forestry professionals as well as policy makers as it accurately provides multiple functions of forest ecosystems. For many years, we had been lacking in establishing a repeatable and comprehensive national forest inventory system in Bangladesh required for mapping forest coverage and socio-economic scenario. Now with the implementation of the Bangladesh Forest Inventory (BFI), a system is in place to provide accurate information as to forest and tree coverage in the country with mention of different uses. The system is the main tool in the forestry sector for monitoring progress towards achieving Sustainable Development Goal No.15 – Life on Land. It helps adopt appropriate policies and plans related to other national forestry related priorities as well. It is also the basis for Monitoring, Reporting and Verification (MRV) of Reducing Emissions from Deforestation and Forest Degradation (REDD+) activities that maintain and increase terrestrial carbon stocks to address climate change.

I wish to congratulate Bangladesh Forest Department and its partners for their integrated role in successfully implementing the Bangladesh Forest Inventory. With pleasure I endorse this report, an accurate national baseline document which will help us sustainably manage and develop our forest resources in a transparent way. From now on we will be able to confidently take informed decisions as to our plans, policies and projects requiring data of forestry sector. I look forward to have similar future inventories done in a regular interval. Finally, I am delighted to record my appreciation for officials of Forest Department and consultants of FAO for their cordial efforts in producing this national forest inventory document. I would like to urge all the officials of Bangladesh Forest Department to keep going with sincere endeavour, innovation and proactive role to profile forestry as a viable sector for promoting and implementing sustainable forest management in all its dimensions and capturing its contribution to improving human livelihoods as well as poverty reduction in the country.

**Ziaul Hasan ndc**  
Secretary  
Ministry of Environment, Forest and Climate Change



Tree and forest resources play an important role to the sustenance and livelihood of many people of Bangladesh, but the sustainability of those resources is threatened by population growth, agriculture land expansion and shifting land tenure. It is essential to monitor trees and forests to inform decision makers about their status and plan strategies and form policies that ensure sustainable use of forestry resources.

This publication was produced to meet the needs of forest managers and policy makers using results from the Bangladesh Forest Inventory (BFI) first cycle (2015-2019). Although the implementation of the inventory was carried out with financial support from USAID and technical support from Food and Agriculture Organization of the United Nations (FAO) and SilvaCarbon, it is anticipated that future inventories will be performed by a fully institutionalized unit within the Forest Department. The data generated from across the country and over multiple inventory cycles will help Forest Department succeed in its goals to effectively monitor and ensure wise stewardship of the country's forest.

This publication gives readers a glimpse of the total inventory process, including its design, protocols, and partnerships. It provides results about tree and forest extent, tree diversity, regeneration status, income for livelihoods and other important indicators of sustainable forest management. The results include quantifying the supply and demand of forest resources, which highlights the relationship between communities and forest and helps in deciding interventions. The report provides relevant information for reaching national targets, including sustainable development goals, and reporting to national and international frameworks. It is with great pleasure that the Forest Department presents the final results of the BFI.

**Md. Amir Hosain Chowdhury**  
Chief Conservator of Forests  
Forest Department



The United States Agency for International Development (USAID) has supported the development of Bangladesh since the country gained independence in 1971. Over this time, Bangladesh has made impressive strides in many sectors, including agriculture, natural resource management, education, and health. These improvements have increased the nation’s prosperity, food security, and resilience to natural disasters. USAID is proud of its partnership with the government and people of Bangladesh and we are encouraged by the positive results emerging from investments in development projects.

The Bangladesh Forest Inventory (BFI) is Bangladesh’s first comprehensive nationwide, long-term forest monitoring system. The BFI is the culmination of a four-year, \$5.6 million commitment by USAID, to support the Government of Bangladesh’s priorities in climate change adaptation, biodiversity conservation, and natural resource management. With this tool Bangladesh will be able to make long-term policy decisions regarding trees and forest resources and their contribution to sustainable livelihoods.

Science, technology, and innovation are vitally important to the success of USAID’s activities as they have the transformative power to accelerate development impact, improve cost-efficiency, and increase program reach and sustainability. Tools like the BFI strengthen the evidence for building resilience to natural hazards by increasing the quality of research and analytical skills for assessing risk and promoting adaptation, mitigation, and resilience.

USAID is pleased to support the Bangladesh Forest Department to implement the BFI as its long-term forest monitoring system. This comprehensive and innovative system integrates remote sensing, field measurements, and socio-economic survey results which touch on each major need the Forest Department has to assess and improve Bangladesh’s forest resources.

USAID continues to support the Government of Bangladesh’s efforts to sustainably manage the country’s forest resources and looks forward to seeing the Bangladesh Forest Inventory used to enhance these efforts.

A handwritten signature in blue ink, appearing to read "Derrick S. Brown".

**Derrick S. Brown**  
Bangladesh Mission Director  
United States Agency for International Development



Food and Agriculture  
Organization of the  
United Nations

The current state of the world's forests means that sustainable forest management has never been more relevant because trees and forests play such a fundamental role in the global nutrients cycling, carbon sequestration, conservation of biodiversity, and provision of forest products to livelihoods. The message that future prosperity is linked to wise stewardship of natural resources is gaining greater public recognition.

Over the past four decades, FAO has been providing technical support to the Government of Bangladesh as sustainable tree and forest management has increasingly been considered in national plans and strategies. Whether through developing technical capacity or through direct support to implement forest monitoring, FAO is committed to assisting the government to meet its sustainable forestry goals, including its sustainable development goals and 7th five-year plan targets.

Tree and forest monitoring is crucial to provide baseline information to policy makers for planning and guiding interventions. The launch of the Bangladesh Forest Inventory in 2016 was a great achievement towards long-term national monitoring of tree and forest resources. Throughout the first cycle of the Bangladesh Forest Inventory, the Forest Department, especially the RIMS unit, proved its capacity in deploying an innovative system that benefits from the latest technologies and to implement an exemplar national forest monitoring system in Asia.

FAO congratulates the Forest Department for this successful implementation and reiterates its support when needed for sustainable forest management. The knowledge disseminated through this report has the potential to be far reaching and impactful, influencing many sectors outside forestry towards integrated natural resources management.

A handwritten signature in blue ink, appearing to read 'RS', with a long horizontal flourish extending to the right.

**Robert Simpson**

Representative

Food and Agriculture Organization of the United Nations

# Acknowledgments

The Bangladesh Forest Inventory was implemented through the project Strengthening National Forest Inventory and Satellite Land Monitoring System in support of REDD+ in Bangladesh. The project was jointly conceived in 2013 by the Forest Department (FD), Food and Agriculture Organization of the United Nations (FAO) and the United States Agency for International Development (USAID). Funding for the project was provided in 2015 by USAID. The overall implementation and coordination of project activities was led by the Resources Information Management System (RIMS) unit in the FD and under the Ministry of Environment, Forest and Climate Change (MoEFCC). Support for day to day activities in coordinating field work, data management, and data analysis was provided jointly by FD and FAO. Further technical support was also provided by SilvaCarbon throughout the project.

This report reflects the inputs and contributions of numerous individuals and entities who each had an important part in the successful completion of the first cycle of the BFI. These contributions are captured in the following tasks and experts listed (in alphabetical order by last name), along with Sections 2.1.2. and 2.1.3 of this report.

*Photo: Bangladesh Forest Inventory Team,  
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# List of Acronyms

FYP - Five Year Plan	GoB - Government of Bangladesh
ACF - Assistant Conservator of Forests	GPS – Global Positioning System
AGB – Above Ground Biomass	GS – Growing Stock
AF - Arannayk Foundation	Ha - Hectare
BA – Basal Area	HH – Household
BBS - Bangladesh Bureau of Statistics	HTAC – Household Tree Availability Class
BDT – Bangladesh Taka	HZ - Hill Zone
FD- Forest Department	IFESCU – Institute of Forestry and Environmental Sciences Chittagong University
BFI - Bangladesh Forest Inventory	LCC - Land Cover Class
BGB - Below Ground Biomass	mill. - Million
BNH – Bangladesh National Herbarium	MoEFCC – Ministry of Environment, Forest and Climate Change
CAGB – Carbon in Above Ground Biomass	MRI - Margalef’s Richness index
CBD – Convention on Biological Diversity	NLCL- National Land Class Legends
CBGB – Carbon in Below Ground Biomass	LRSB –Land Representation System of Bangladesh
CCF – Chief Conservator of Forests	PEI - Pielou’s Evenness index
CHTRC - Chittagong Hill Tracts Regional Council	QA/QC - Quality Assurance and Quality Control.
C&I - Criteria and Indicator	SDGs - Sustainable Development Goals
CIP - Country Investment Plan	SDI - Simpson’s Dominance index
CR - Critically Endangered	SE – Standard Error
CZ - Coastal Zone	SFM - Sustainable Forest Management
CWD – Coarse Woody Debris	SOC – Soil Organic Carbon
DAN – Data Analysis	SRDI – Soil Research and Development Institute
DB - Dead Biomass	SuZ- Subdarbans Zone
DBH - Diameter at Breast Height	SWDI - Shannon-Wiener Diversity Index
DCF - Deputy Conservator of Forests	SZ - Sal Zone
DCCF – Deputy Chief Conservator of Forests	UN - United Nations
DU – University of Dhaka	UNREDD - The United Nations Programme on Reducing Emissions from Deforestation and Forest Degradation
EFCC - Environment, Forestry and Climate Change	USAID – United States Agency for International Development
EN - Endangered	USFS – United States Forest Service
ES - Ecosystem Services	VU – Vulnerable
FAO - Food and Agriculture Organization of the United Nations	VZ - Village Zone
FGD - Focused Group Discussion	Yr – Year
FRA - Global Forest Resources Assessment	
FWD – Fine Woody Debris	
GDP - Gross Domestic Product	
GIS – Geographic Information System	