



Section 1:

A new era for forest assessment and monitoring



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Trees and forests are of immense importance to the world's population due to their role in global nutrient cycles and provision of a wide array of goods and services. An increasing amount of both public interest and political will are directed towards plans and strategies that develop, protect, manage and conserve forest resources. In Bangladesh, trees and forests play a crucial role in the country's plans towards sustainable development. Ideally, these natural resources should be managed in such a way that balances commercial production, food security and sustainable livelihoods with protection of biological diversity, conservation of plant, soil and water resources, and mitigating climate change. Achieving this balance requires innovative and forward-thinking approaches in tree and forest assessment, monitoring, and management.

The BFI participates in a new era of forest assessment and monitoring because it: 1) provides long-term monitoring, 2) is designed to be fully institutionalized, 3) uses multiple sources of information and the latest forest mensuration technologies, and 4) meets the data needs of multiple purposes. In parallel, its conception and implementation involved a wide range of national stakeholders to ensure their engagement and their contribution throughout the process. Despite the simple name, it is more than just a database of tree measurements. It achieves "the technical process of data compilation and analysis of forest resources from a multitude of data sources, including field inventories and remote sensing, to estimate relevant forest characteristics at particular points in time" (FAO 2017b). The BFI not only quantifies benefits from forests and Trees Outside Forest (TOF), it also provides information about their relationships with the people that use them and makes accessible the information to multiple beneficiaries (FAO 2015b). Furthermore, the BFI is designed to be updated through periodic field measurement cycles, which helps meet evolving societal needs. It is the country's national forest monitoring system (NFMS) for providing science-based information to support policies to conserve and sustainably manage forests in Bangladesh.



Environmental and social challenges

As in many countries, deforestation and forest degradation has been occurring in Bangladesh for hundreds of years. The country's forests are heavily used but the ability to restore forests is limited. Although overall tree canopy coverage increased modestly from 2000 to 2014, the natural forest area declined rapidly (Potapov, Siddiqui et al. 2017), and there is a persistent widening gap between the demand and supply of forest products (Rahman 2016). There is limited national level information about the status of tree and forest resources to guide local to national forest management and conservation activities.

The growing need of land for human settlement, agriculture, industries, and timber and fuelwood is largely responsible for deforestation and forest degradation (Chowdhury, Costello et al. 2016). Most of the forest loss can be attributed to overpopulation, poverty and unemployment, and lack of governance (UN-REDD 2017). Governance impacts all forest types and specifically included problems related to uncertainty in land tenure and lack of capacity to implement forestry related management, policies, and law enforcement. These indirect drivers in turn lead to a suite of direct drivers of deforestation, namely uncontrolled encroachment from industrialization and agriculture, and illegal logging (UN-REDD 2017). Specific direct drivers of forest degradation differ by zone. For example, forests in Sundarban and Coastal zones compete with shrimp farming or suffer from industrial pollution related to shrimp farms, pesticides, and oil spills. On the other hand, forests in the Sal and Hill zones experience intense pressure due to firewood collection, illegal logging, and exotic species (Chowdhury, Costello et al. 2016). The Sundarbans are threatened with oil spills from cargo vessels (Aziz and Paul 2015) and increasing numbers of factories and thermal power plants. The waste and pollution generated impact water quality and threaten the mangrove ecosystem (Sarker, Akhand et al. 2016).

The impacts of deforestation and forest degradation in Bangladesh often interact with natural disturbances. For example, despite a moratorium on logging lasting from 1989 until 2020, in the Chittagong Hill Tracts, the exploitation of trees has resulted in a substantial loss of forest cover and soil degradation. Removals of timber and poles and shifting cultivation has degraded landscapes, and when coupled with heavy rainfall has led to heavy soil erosion and landsliding (Mahmood and Khan 2010). Furthermore, in low lying areas the impacts of both human and natural disturbances are more

severe in Bangladesh than in neighboring countries due to its vulnerable location among major river systems GOB (2015). Rising sea levels in combination with storms and cyclones make coastal areas especially vulnerable. Salinity intrusion, caused by reduced freshwater flow, changing rainfall patterns and growing aquaculture industry could reduce the fresh water supply for people and their crops (Dasgupta, Hossain et al. 2014, Dasgupta, Akther Kamal et al. 2015).

*Photo: QA/QC training, Cox's Bazar,
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Evolution of forest assessment

Previous forest policies and inventories reflect the history of how people viewed Bangladesh's natural resources. Beginning in the British colonial period, forest resources of the Indian subcontinent were diverse and seemed to be unlimited. However, the colonial authorities soon took into consideration that British India's forests were not inexhaustible. Although a national level forest inventory was not available until 2005 (MoEF and FAO 2007), there is a 200 years history of forest inventories at the sub-national level. The first inventory was implemented from 1769 to 1773, but it was limited to selected forest areas in Sundarban. Later, various forests inventories were undertaken for the preparation of forest management plans for major forest types (e.g. mangrove forests in the Sundarban; hill forests in Chittagong, Cox's Bazar, Sylhet and Chittagong Hill Tracts; sal forests in Gazipur, Tangail and Mymensingh). These inventories focused on forest area and crude estimates of what is now characterized as growing stock volume. Only recently did inventories begin to include more forest variables for understanding biological diversity and carbon storage. A complete list of past forest inventories in Bangladesh is found in Appendix 1.3.



The national forest and tree resources assessment 2005 – 2007

During 2005-2007, the Forest Department implemented the first National Forest Assessment (NFA) which covered both forests and TOF whereas earlier management inventories were confined within the designated forest reserves only (MoEF and FAO 2007). The NFA objective was to capture detailed information about forest resources and land use. It included remote sensing analyses and a ground inventory with 299 sampling plots (referred to as tracts) throughout the country in a systematic design. Further, the inventory enumerated national land use area, growing stock, biodiversity and regeneration, social and economic aspects of forests and trees and biomass and carbon.

Though the NFA has been used for international reporting purposes, its current use for informing and impacting policies is limited as national objectives and the environment sector have shifted to capturing and monitoring changes at both the national and sub-national scales. In addition, although the NFA design was statistically sound at the national scale, it suffered from some key technical limitations. Firstly, the strategy to establish relatively large but fewer plots resulted in an under representation of certain important forest types such as Sal forest and coastal plantation areas which are key strategic forest types for FD. Second, estimations of volume, biomass, and carbon only used one general allometric equation for all tree species. Third, the inventory was not usable for monitoring purposes as the plots could not be relocated to update the information to observe changes over time (Costello, Piazza et al. 2016). For these reasons, the NFA was discontinued, leaving a widening gap between the information needed for national forest assessment and what was available.

Box 1 – Comparing BFI and 2005-07 NFA results

Both the BFI and 2005-07 NFA provide national level estimates of forest area, volume, biomass, carbon, and information about tree and forest socio-economic products and services. Nonetheless, comparisons between the two inventories are complicated because each uses different land cover classification systems, allometric equations, and sampling design and intensity. For example, the choice about which allometric equations to use in an inventory can dramatically alter volume, biomass, and carbon estimates (Duncanson, Huang et al. 2017). Additionally, the NFA socio-economic survey did not collect information about the value and income from tree and forest products, but this was the central purpose of the BFI socio-economic survey. In some cases, meaningful comparisons are possible after adjusting the BFI data, for example by using the same volume equation for both datasets. Some comparisons with explanations are included throughout this report and more comparisons are found in Appendix 1.2.





Establishing sustainable goals

A number of national targets, plans and strategies have been developed in Bangladesh and globally that are aimed at achieving both environmental responsibility and economic growth through science-based policy decisions. In September 2015, the UN General Assembly approved 17 Sustainable Development Goals (SDG's) that are meant to link and address societal, economical, and environmental issues. To achieve SDG 15⁴, the 7th Five Year Plan (2016-2020) of Bangladesh (7FYP) targets to have productive forest coverage at 20 percent with 70 percent crown density. The 7FYP strategies for achieving the goals include continuing a moratorium on felling trees in natural forests, increasing tree density through 'enrichment planting' and 'assisted natural regeneration', intensification of plantation activities in coastal areas and continuing social forestry programmes (GED 2015).

A five-year (2016-2020) country investment plan (CIP) was also recently developed and endorsed to coordinate the management of the environment, forestry and climate change (EFCC) sectors in the country. This supports the implementation of the National Conservation Strategy of Bangladesh by overcoming challenges related to lack of coordination among ministries. The CIP is a cross-sectoral and whole-of-government investment framework for mobilizing and delivering effective, coordinated, sustainable and country-driven investment programmes in environmental protection, sustainable forest management, climate-change adaptation and mitigation, and environmental governance. The CIP will be monitored on an annual basis to track the impact of investments, identify success stories and challenges, and provide recommendations for improvements (GoB 2017a).

There are several other important policies related to sustainable forest management. For example, the National Forest Policy (Amended) 1994 attempted to bring 20% of the country's land under afforestation programmes by 2015 (GoB 2016). In addition, the Perspective Plan of Bangladesh 2010-2021 aims at increasing the tree coverage on 2.84 million hectares designated for forests (GED 2012). Finally, the vision of the draft National Forestry Policy 2016 is to increase and stabilize its forest cover to at least 20% of the country's geographical area.

⁴ SDG 15 is "Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss".

In parallel to the above developments, in March 2018 Bangladesh became eligible to graduate from a Least Developed Country and will officially graduate given the ability to meet certain requirements over the next 6 years. While this is a significant achievement, challenges remain to sustainably manage the country's natural resources while maintaining economic growth.

A national forest monitoring system is potentially a powerful tool for achieving SDG's and related national plans and strategies. However, to truly empower progress towards these goals through science-based decision making, an NFMS needs to go beyond traditional measurements such as merchantable timber volumes. Multi-purpose and multi-resource forest inventories gather information on many different attributes of forests which forest managers and decision makers use for policy formulation, strategic planning, day-to-day management operations and monitoring.





Photo: Accessing the plot center, the Sundarban,
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