The submission of Bangladesh's Forest Reference Level for REDD+ under the UNFCCC

Ministry of Environment, Forest and Climate Change (MoEFCC)
Government of the People's Republic of Bangladesh

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Foreword

Bangladesh is identified as one of the vulnerable countries. Analysis of Bangladesh's climate change projection has indicated that Bangladesh is among the most vulnerable regions in the world caused by sea level rise, drought, extreme weather and other climate-related events. Responding to the challenge of climate change is a part of priority policies for Bangladesh and that decisive actions are needed. Bangladesh has carried out a number of measures and actions at the national level, consistent with our commitments under UNFCCC.

In this context, reducing emissions from deforestation and forest degradation (REDD+) and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks is seen as a tool for sustainable development. Through the REDD+ readiness phase, Bangladesh has been successful in building capacity to estimate emission factors and produce activity data and has formulated a national strategy for REDD+ implementation.

This Forest Reference Emission Level (FREL) has been written in-country by a national team, bringing together the most robust national forest related data available, with policy goals for the country's future. The purpose of the FREL is to enable result-based payments for REDD+ implementation that can help steer into a more diversified economy with social equity and harmony with nature.

Bangladesh is hereby providing its FREL document to the international community and is committed to active participation in a comprehensive and fair global effort to address the challenge of deforestation and degradation.

Abdullah Al Mohsin Chowdhury

Preface

Bangladesh is developing its capacity for assessing and implementing REDD+ activities with the support from the UN-REDD Programme since 2011. Stakeholders from different government and non-government organizations, academia, research organization as well as the civil society were involved in the Forest Reference Emission Level/Forest Reference Level (FREL/FRL) Development process through trainings, workshops, seminars and consultations at national and subnational levels.

Land cover maps from 2000 to 2015 were prepared for assessing and monitoring the changes. Tree cover change for the period 2000-2015 were integrated with the land cover maps for identifying the degraded forest areas. Deforestation, forest degradation and enhancement of forest cover were identified as REDD+ activities for calculation of FREL/FRL. National stakeholders were trained, involved and engaged from the beginning of the process of the development of the different products and their integration for the preparation of the FREL/FRL (e.g. field data collection, land cover map, accuracy assessment, calculation of activity data etc.).

FREL/FRL has been developed at national level and for the five zones developed for the national forest monitoring system. While developing the FREL/FRL considerable improvement in technical capacity has been achieved and subsequent submissions will help further in consolidation. The FREL/FRL estimation is based on most recent guidelines of UNFCCC.

The FREL/FRL is expected to be a guiding tool towards reducing deforestation and forest degradation and enhance forest carbon stocks in Bangladesh.

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The submission of Bangladesh Forest Reference Emission Level/Forest Reference Level (FREL/FRL) is an effort of series of studies that have been conducted by the Bangladesh Forest Department under the Ministry of Environment, Forest and Climate Change (MoEFCC). The policy makers, key government officials, experts, academia, and civil societies have been involved to prepare this national document.

At the beginning, the Bangladesh Forest Department wishes to express sincere gratitude to the Honorable Minister, Ministry of Environment, Forest and Climate Change (MoEFCC), Mr. Anisul Islam Mahmud, MP for his effective leadership in preparing this important national document. We are also grateful to the Honorable Deputy Minister, Ministry of Environment, Forest and Climate Change (MoEFCC), Mr. Abdullah Al Islam Jakob for his guidance towards the successful preparation of the report. We are also thankful to Mr. Abdullah Al Mohsin Chowdhury, Secretary, Ministry of Environment, Forest and Climate Change (MoEFCC) for his active guidance to prepare the report. Sincere gratitude to Mr. Mohammed Shafiul Alam Chowdhury, Chief Conservator of Forests, Bangladesh Forest Department, for his immense support and direction for the completion of this report.

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Executive Summary

The report presents Bangladesh's forest reference emission level (FREL)/forest reference level (FRL) which is developed voluntarily in accordance with the UNFCCC decisions (decision 1/CP.16 and decision 12/CP.17) and IPCC Guidelines 2006. The key objective is to measure and monitor the performance of emissions reduction and removals under the REDD+ program in the country. In addition, the FREL/FRL may also be used in future for the purpose of obtaining results-based payments under REDD+, and can serve as a standard for forest monitoring and governance.

The forest definition used for the construction of FREL/FRL is the FAO definition, which is adapted to include mangrove forest areas in Sundarban dominated by *Ceriops decandra* (local name: Goran). The carbon pools considered are above-ground and below-ground biomass, and CO_2 is the only greenhouse gas included for the construction of FREL/FRL. The historical reference period is 2000-2015. The FREL/FRL has included the following REDD+ activities: reducing emissions from deforestation, reducing emissions from forest degradation and enhancement of forest carbon stocks from afforestation/reforestation and forest restoration. The scale of the proposed FREL/FRL is national level but results are also reported separately for the five zones (hill, sal, coastal, village and sundarban) of the country, because the forest dynamics in these five zones are very different. Emissions and removals associated with trees outside forest have been calculated but not accounted for the construction of FREL/FRL, as trees outside the forests do not meet the criteria of the definition of forest. The activity data are obtained from the national land cover maps of 2000 and 2015 and tree cover change map of 2000-2014. The emission and removal factors associated with land use changes are calculated considering the above-ground biomass stocks (Tier 2) per land class and percentage of tree cover in 2000 and 2015.

The proposed FREL of Bangladesh is 1,122,861 tCO_2e/year, and the proposed FRL is -827,410 tCO_2e/year. Emissions from deforestation and forest degradation account for 69% (778,448 tCO_2e/year) and 31% (344,413 tCO_2e/year) respectively of total emissions. Removals of forest carbon stocks from forest restoration and afforestation/reforestation account for 52% (-427,635 tCO_2e/year) and 48% (-399,775 tCO_2e/year) respectively of total removals. Removals from trees outside forest estimated at -490,239 tCO_2e/year for the reference period 2000-2015. However, the contribution of trees outside forest were not considered for the construction of FREL/FRL.

Acronyms and Abbreviations

BCCSAP	Bangladesh Climate Change Strategy and Action Plan
BFD	Bangladesh Forest Department
CHT	Chittagong Hill Tracts
COP	Conference of parties
FAO	Food and Agriculture Organization of the United Nations
FREL	Forest emission reference level
FRL	Forest reference level
GHG	Greenhouse gas
GLAD	Global Land Analysis and Discovery
GoB	Government of Bangladesh
IPCC	Intergovernmental Panel on Climate Change
ISO	Inter National Organization for Standardization
LCCS	Land Cover Classification System
LCML	Land Cover Meta Language
LULUCF	Land use, land use change and forestry
MoEF	Ministry of Environment and Forests
NDC	Nationally determined contribution
NLRS	National Land Representation System
OBIA	Object-Based Image Analysis
RIMS	Resources Information Management System
R-PP	REDD+ Readiness Preparation Proposal
RSC	REDD+ Steering Committee
UNFCCC	United Nations Framework Convention on Climate Change
USF	Unclassified State Forest

1. Introduction

Bangladesh, as a signatory country to the United Nations Framework Convention on Climate Change (UNFCCC) (ratified in 1994), is voluntarily submitting the National Forest Reference Emission Level/ Forest Reference Level (FREL/FRL) based on the decision 1/CP.16, paragraph 71(b), and measures mentioned in paragraph 70 of the same decision (UNFCCC 2011). The country welcomes the opportunity to avail the technical assessment of the FREL/FRL in accordance with the guidelines and procedures adopted under Decision 13/CP.19 (UNFCCC 2014), in the context of results-based payment for *reducing emissions from deforestation and forest degradation and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries (REDD+)*.

As one of the most vulnerable countries to climate change induced natural disasters, Bangladesh is fully aware of the causes of climate change (MoEFCC 2009). According to Bangladesh's Second National Communication on greenhouse gas (GHG) inventory to UNFCCC, submitted in 2012, the Land-use, Land-use Change and Forestry (LULUCF) sector was the second biggest contributor to CO_2 emissions in the country after the energy sector. The former sector contributed to about 31% of total CO_2 emissions while the latter sector contributed 64% of the total national emissions (MoEFCC 2012). Although no precise estimate is available, the LULUCF sector is thought to remain one of the biggest contributors to GHG emissions in the country. Consequently, reducing emissions from the LULUCF sector has become a priority to the Government of Bangladesh (GoB). Indeed, as a long-term strategy of GoB to reduce GHG emissions from LULUCF sector, the National REDD+ Steering Committee (RSC) was formed in July 2011. The REDD+ Readiness Roadmap was prepared and endorsed by the RSC in December 2012. Subsequently, in June 2013, the UN-REDD Programme invited Bangladesh to submit a REDD+ Readiness Preparation Proposal (R-PP), based on which the government is implementing UN-REDD Bangladesh National Programme since 2015. The goal of the National Programme is to support GoB to initiate the implementation of its REDD+ Readiness Roadmap by establishing necessary management processes, identifying strategic readiness options, and developing the capacities required to begin implementation of REDD+ activities. Hence, as a part of the National REDD+ Readiness Roadmap, the country has developed the FREL/FRL for submission to the UNFCCC.

The overarching objective of this voluntary submission of the FREL/FRL report is to facilitate the receipt of results-based payments, as per Decisions 9/CP.19, 13/CP.19 and 14/CP.19 (UNFCCC 2014). This submission therefore does not represent any commitment under the Nationally Determined Contribution (NDC) of Bangladesh. Rather, the preparation and development of national FREL/FRL will enhance the documentation and monitoring of forest resources, which will eventually strengthen capacity of Bangladesh Forest Department (BFD) on management information focusing on current status of forest resources and stored carbon in the forests, as well as vulnerable land-use zones. Hence, this document will facilitate natural resources management planning in future and be able to provide better concept and tools for forest monitoring and governance.

The document is structured in such a way that it includes all necessary components of FREL/FRL in a logical order. The next section (section 2) explains the national context of Bangladesh in terms of forest governance and management as well as forest resources. Section 3 starts with definition of forests used for, and then specifies the pools and gasses, and REDD+ activities included in as well as the scale of constructing the FREL/FRL with appropriate justifications. The following section (section 4) presents the

activity data (i.e. land and tree cover maps), emission factors, reference period and methodology used for FREL/FRL. The proposed national FREL/FRL is presented in section 5. The uncertainty and national circumstances related to REDD+ activities and transparency of data and process used for constructing FREL/FRL are explained in the following three sections (Section 6 - 8), before future improvement opportunities are identified in the final section (section 9).

2. National Context

2.1 Forest resources in Bangladesh

In Bangladesh, *'forest land'* is defined as a government-owned land. The legal entity and governance of *'forest land'* is established through gazette notifications under the Forest Act of 1927 (amended up to 2000) and other forest related acts, ordinances, regulations and policies (Mohammad 2013, Rashid, Craig et al. 2013). Some of the prevailing acts, ordinances, regulations and policies are:

- Wildlife (Conservation and Preservation) Act 2012
- Biodiversity Act 2017
- Social Forestry Rules 2004 (amended up to 2011)
- Forest Transit (control) rules 2011
- Environmental Conservation Rules 1997 (amended up to 2017)
- Environmental Conservation Act 1995 (amended up to 2002)
- National Forest Policy 1994
- Forestry Master Plan 1994
- Atia Forest Ordinance 1982
- Private Forest Ordinance 1959
- State Acquisition and Tenancy Act 1950
- Assam Forest Regulations 1891 and
- National Environmental Management Action Plan (NEMAP) 1995.

The Bangladesh Forest Department (BFD) manages *'forest land'* under different legal arrangements. Most of *'forest land'* under the management of BFD are areas declared as reserved, protected, acquired, vested, and unclassified forests. The total area of *'forest land'* and its administrative and legal *'forest land'* categories are shown in Table 1. However, this legal definition of *'forest land'* does not consider land use/cover characteristics and, therefore, may include areas with no tree cover. Thus, *'forest land'* represents the land under the regulatory regime of BFD and Chittagong Hill Tracts District Administration (Table 1), rather than forest as defined by Forest Resource Assessment or REDD+.

Table 1: State-owned *'forest land'* by legal categories (BFD 2017)

***'Forest land'* by legal categories**	**Definition**	**Area in hectares (ha)**	**Remarks**
Reserved Forests	Everything is strictly prohibited unless otherwise permitted	1,818,219	Under the control of Bangladesh Forest Department
Protected Forests	Everything is permitted except otherwise prohibited.	37,009	
Acquired and Vested forests	Prohibition of certain activities within privately owned lands or other lands for the protection of publicly owned forest, or for the protection of	11,579	

'Forest land' by legal categories	Definition	Area in hectares (ha)	Remarks
	property and the environment.		
Unclassified State Forest (USF)	Depleted and denuded state-owned forests subject to various disturbances, particularly through shifting cultivation by tribal people.	17,353	
		695,226	Under the control of District Administration of Chittagong Hill Tracts
Total		**2,579,387**	

In addition, accurate geographical information of *'forest land'* boundaries are inadequate. The *'forest land'* boundaries are neither well demarcated in the field nor digitally delineated. Therefore, BFD relies on hard copy of Cadastral Survey, Revisional Survey and Bangladesh Survey maps for management of *'forest land'*. However, the digitization and delineation of *'forest land'* boundaries has been conducted only on a pilot basis.

Apart from the state-owned forests, Bangladesh also has privately owned village forests, known as homestead forests where trees are planted throughout the country in areas that are not designated as *'forest land'*. The estimated privately owned village forests is 270,000 ha (BFD 2007). There is also land with trees owned by different government agencies such as land located adjacent to railways (owned by the Bangladesh Railway), roadsides (Roads and Highways Department) and embankments (owned by the Bangladesh Water Development Board), that are not designated as *'forest land'.*

2.2 Land cover, zoning and tree cover maps

2.2.1 Land cover maps

The National Land Representation System (NLRS) represents the land classes in the country based on a transparent, accurate, complete, comparable and consistent methodology (GoB 2017). NLRS is developed using the latest version of the Land Cover Classification System (LCCS v.3), which is a tool recognized by the International Organization for Standardization (ISO) for classifying land in an area.

The NLRS is the result of several processes of data collection, translation, analysis and identification of gaps of existing land mapping processes. Its preparation involved 11 governmental, non-governmental and academic entities from 2013 to 2016 (Hadi, Shabnam et al. 2016). The NLRS represents all existing land classes in Bangladesh, including the ones identified by previous land assessment and monitoring activities. In total 64 land classes were described in the NLRS of Bangladesh (GoB 2017) based on existing map legends and more than 1,000 representative field ground measurements (BFD 2016).

The legends of the national land cover maps 2015 and 2000 have been prepared using the NLRS (Islam, Iqbal et al. 2016). In total, 33 land classes have been defined for the national land cover map of 2015 (GoB 2017), while 24 land classes have been defined for the national land cover map of 2000 (GoB 2017). These two maps have been used to calculate the activity data for the construction of FREL/FRL and are further described in Section 4.1.

The legends used for the national land cover maps 2000 and 2015 are categorized into two broad classes mainly 'vegetated' and 'non-vegetated'. Each of the classes are further divided based on presence of water as 'terrestrial' and 'aquatic' or simply 'water'. The classes are again categorized based on artificiality as

'natural' and 'cultivated' or 'artificial'. A schematic overview of the national land representation system is given in Appendix A.

2.2.2 Zoning for national tree and forest assessment

BFD developed a zoning map to stratify and assess forest and tree resources in the country (Figure 1). The key objective of the zoning map is to delineate homogenous sub-populations that will remain constant over time in terms of physiographic attributes like soil types, elevation, climate, altitude and soil salinity (BFD 2016).

Five zones (hill, sundarban, sal, coastal and village) have been identified (BFD 2016) within the national mouza (smallest type of land administrative unit) boundary map obtained from the Bangladesh Bureau of Statistics (BBS). The zoning map was developed to support the stratification for the latest Bangladesh Forest Inventory (BFI 2015-2018) which is based on the five zones and referred to as BFI zones. The zoning boundary delineation are based on the physical characteristics. Hence, zone boundaries may not match administrative boundaries. In the BFI zones, there are different legal categories of 'forest land' as described in Table 1 and different classes of the national land cover maps 2000 and 2015. The dominant land classes and other characteristics of BFI zones are described below and in Table 2.

The **hill** zone represents geographical areas with hills. The average altitude of hill zone is 125 m (Jarvis, Reuter et al. 2008). Water and terrestrial land area occupy 3% and 97% respectively of hill zone (GoB 2017). The mean annual precipitation is 2720 mm (2061 - 4370 mm) (Hijmans, Cameron et al. 2005). The soils of hill zone have been classified as acid sulphate, brown hill, and noncalcareous grey floodplain (non-saline) (FAO and UNDP 1988). This zone consists of hill forest (ever green and semi ever green forest types) and the most common tree species are *Dipterocarpus spp*., *Syzygium spp., Gmelina arborea, Ficus carica, Grewia spp.*, *Albizia spp., Acacia auriculiformis, Artocarpus heterophyllus, Swietenia mahagoni, Tectona grandis, Acacia auriculiformis,* and some other homestead tree species such as *Mangifera indica etc.*

The **sundarban** zone represents geographical areas of sundarban where the average elevation ranges from 2 to 9m from mean sea level. The average altitude of sundarban zone is 6 m (Jarvis, Reuter et al. 2008). Water and terrestrial land area occupy 37% and 63% respectively of sundarban zone (GoB 2017). The mean annual precipitation is 2004 mm (1783 - 2343 mm) (Hijmans, Cameron et al. 2005). The soil of sundarban zone have been classified as acid sulphate and non-calcareous grey floodplain (non-saline) (FAO and UNDP 1988). This zone consists of natural mangrove forest and the most common tree species are *Heritiera fomes, Exocaria algallocha, Ceriops decandra,* etc.

The **sal** zone represents the geographical areas in Madhupur and Barind tract with small hillocks and plain land. The average altitude of sal zone is 17 m (Jarvis, Reuter et al. 2008).Water and terrestrial land area occupy 3% and 97% respectively of sal zone (GoB 2017). The mean annual precipitation is 2040 mm (1804 - 2462mm) (Hijmans, Cameron et al. 2005). The soils of sal zone have been classified as acid basin clays, brown hill, brown mottled terrace, deep red-brown terrace, shallow grey and shallow red-brown terrace (FAO and UNDP 1988). This zone consists of plain land forest known as sal forest (deciduous types) and the most common tree species are *Shorea robusta, Albizia spp., Artocarpus heterophyllus, Swietenia mahagoni, Acacia auriculiformis etc.* and some other homestead tree species such as *Mangifera indica*.

The **coastal** zone represents geographical areas with accreted land in the southern part of the country. The average altitude of coastal zone is 3 m (Jarvis, Reuter et al. 2008). Water and terrestrial land area occupy 55% and 45% respectively of coastal zone (GoB 2017). The mean annual precipitation is 2870 mm (2267 -

3698 mm) (Hijmans, Cameron et al. 2005). The soils of coastal zone have been classified as brown hill, acid sulphate, calcareous aluvium (non-saline), calcareous grey floodplain, non-calcareous alluvium and non-calcareous grey floodplain (FAO and UNDP 1988). The most common tree species in the coastal zone are *Sonneratia apetala, Avicennia officinalis, Excoecaria agallocha, Areca catechu* and other homestead tree species such as *Artocarpus heterophyllus, Samanea saman, Azadirachta indica, Mangifera indica etc.*

The **village** zone covers the rest of the area not occupied by hill, sundarban, sal and coastal zone. The average altitude of village zone is 16m (Jarvis, Reuter et al. 2008). Water and terrestrial land area occupy 8% and 92% respectively of village zone (GoB 2017). The mean annual precipitation is 1600 mm (Hijmans, Cameron et al. 2005). The soils of village zone have been classified as acid basin clays, brown hill, calcareous alluvium (non-saline), calcareous brown floodplain, calcareous dark grey floodplain, deep grey terrace, grey piedmont, non-calcareous alluvium, non-calcareous brown floodplain, non-calcareous dark grey floodplain, non-calcareous grey floodplain (non-saline), and shallow Grey Terrace (FAO and UNDP 1988). The most common tree species of village zone are *Swietenia mahagoni, Areca catechu, Mangifera indica, Acacia auriculiformis, Samanea saman, Eucalyptus camaldulensis, etc.*

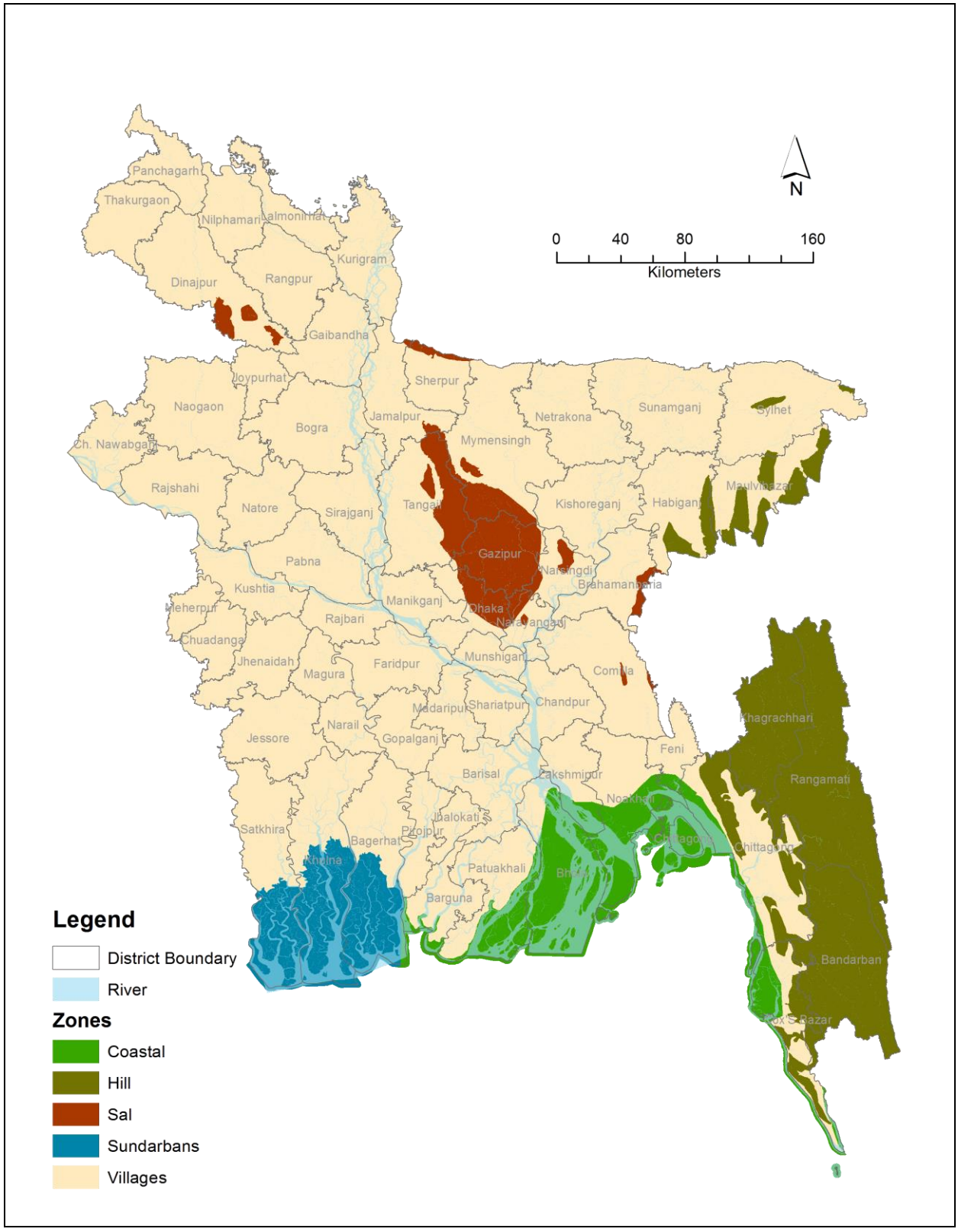

Figure 1: Zoning for national tree and forest assessment under the Bangladesh forest inventory (BFD 2016).

Table 2: Description and major characteristics of Bangladesh forest inventory (BFI) zones (BFD 2016).

BFI zones	**Districts**	**Geographic characteristics**	**Dominant land classes per BFI zone**	**Area* (in hectares)**	**Accessibility (%): Hard to reach (HTR)**	**Number of Households** (BBS, 2015)
Hill	Bandarban, Chattogram, Cox's Bazar, Habiganj, Khagrachhari, Maulvibazar, Rangamati, Sylhet	Terrestrial land: 97%; Water: 3 %	• Forest Tree Dominated Area (Terrestrial): 727, 004 ha; • Shrubs with scattered trees: 691,921 ha	1,716,157	Extreme HTR: 51.60 Very HTR: 15.46	3,574,726
Sundarban	Bagerhat, Khulna, Satkhira	Terrestrial land: 63%; Water: 37%	• Mangrove Forest: 399,725ha Rivers and Khals: 228,201ha	631,386	Extreme HTR: 33.87 Very HTR: 0.04	1,354,487
Sal	Brahamanbaria, Kumilla, Dhaka Dinajpur, Gazipur, Habiganj Jamalpur, Mymensingh, Narayanganj, Narsingdi, Sherpur, Tangail	Terrestrial land: 97%; Water: 3%	• Herbaceous Crops: 221,946ha • Rural Settlement: 159,188 ha	534,433	Extreme HTR: 12.01, Moderate HTR: 1.26 Very HTR: 6.26	10,127,177
Coastal	Barguna, Bhola, Chattogram, Cox's Bazar, Feni, Lakshmipur, Noakhali, Patuakhali	Terrestrial land: 45%; Water: 55%	• Rivers and Khals: 478,751ha • Herbaceous Crops: 229,353 ha,	991,051	Extreme HTR: 24.31 Very HTR: 1.42	2,148,757**
Village	Rest of districts	Terrestrial land: 92%; Water: 8 %	• Herbaceous Crops: 6,591,982ha • Rural Settlement: 2,763,442ha	10,883,974	Extreme HTR: 13.07 Very HTR: 12.10 Moderate HTR: 0.52	14,500,537
National	64 districts	Terrestrial land: 88% Water: 12%	• Herbaceous Crops 7,170,870 ha • Rural Settlement: 3,124,434 ha	14,757,000	Extreme HTR: 19.5 Moderate HTR: 0.43 Very HTR: 11.13	31,705,684
* The land area figures have been obtained from the intersection of land cover maps 2015 with 2000 and have been adjusted to be in line with the total land area of the country 14,757,000 hectares reported by the Bangladesh Bureau of Statistics (BBS 2017). ** The number of households excludes the same for Chattagram and Cox's Bazaar to avoid double counting, as these two Districts fall in both hill and coastal zones.						

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2.2.3 Tree cover maps

In 2016, the Resources Information Management System (RIMS) unit of the BFD in collaboration with the Global Land Analysis and Discovery (GLAD) Laboratory of the University of Maryland published the tree cover change map of the country over the period of 2000 to 2014 (Potapov, Siddiqui et al. 2017). The tree cover mapping and monitoring system is based on the integrated use of wall-to-wall Landsat-based mapping and sample-based area estimation using freely available high spatial resolution imagery and Landsat time-series data.

A two-stage method for national tree cover monitoring was established. At the first stage, wall-to-wall Landsat-based tree cover extent and change maps were created. These maps served to stratify the whole country for the implementation of a stratified random sampling protocol (Potapov, Siddiqui et al. 2017). The second stage of the analysis consisted of characterizing tree cover area and change based on samples of multi-resolution time-series data. Stratified random sampling design was used based on Landsat-derived wall-to-wall maps as sampling strata. A set of 1486 samples consisting of 30 x 30 m Landsat pixels was visually interpreted to estimate fractional (% of pixel area) tree canopy cover and canopy loss and gain. Though very useful to understand the tree cover gains and losses, the tree cover maps do not provide information on the forest or non-forest status of land. Since, these maps provide information on presence of trees, this information can be used within the land classes to detect gains or losses of trees, and therefore emissions or removals of CO_2.

2.3 Trees outside forest

Due to land scarcity and rapid population growth, expanding designated '*forest land*' is extremely difficult in Bangladesh. In this context, BFD is trying to increase the tree cover outside '*forest land*' through encouraging tree plantations in homestead and participatory approaches like social forestry on embankments in the coastal area, road side plantations, and other forestry activities (Appendix B). As a result of these activities, over the period of 2000 to 2014 total tree canopy cover increased by 135,700 ha, and most of the tree cover gain was found within trees outside forest areas located in the boundaries between woodlots and croplands, near houses, and along roads (Potapov, Siddiqui et al. 2017).

In Bangladesh, trees outside forest play a key role in rural livelihoods. More than 70% of fuelwood, 80% of bamboo and more than half of national wood production comes from homestead forests (Islam 2004). Hence, the role of trees outside forest is important because they directly reduce the pressure on the designated forests of the country by supplying additional forests resources. Trees outside forest also contribute to households income and are important for water purification, biodiversity conservation and land restoration (Islam 2004). For these reasons, carbon sequestration in trees outside forest has been assessed and is presented in this report. However, the emissions and removals associated with trees outside forest are not accounted for the construction of FREL/FRL, as they do not meet the definition of forest described in Section 3.1

2.4 Forest trends and government strategic plans in Bangladesh

Despite the tree cover gain in the country, 2,600 ha of forest lost annually over the period of 1990 to 2015 (FAO 2015). A study on the direct and indirect drivers of deforestation and forest degradation has been conducted and is based on data collected from a literature review and workshops carried out in BFD districts (BFD 2018). The results from this study showed that the key drivers of deforestation and forest degradation are common across the country and include illegal harvesting of forests, fuelwood harvesting,

subsistence and commercial agriculture (including shifting cultivation in hill forests), and encroachment by industry and/or settlements (BFD 2018). The insufficient demarcation of boundaries of 'forestland' has further worsen the situation. In addition, between 1971 and 2015 more than 64,000 ha of 'forestland' has been transferred to other agencies for non-forest purposes (BFD 2018). While most drivers are common to all forest types, there are some drivers that are specific to each forest type.

More specifically, in Hill forests, apart from illegal and excessive wood and fuelwood harvest other drivers of deforestation include jhum agriculture (shifting cultivation practiced by ethnic groups) and commercial agriculture such as horticulture, tobacco and root crops. Tobacco farming is spreading in Hill forests with an increased demand for fuelwood for leaf curing. In addition, anthropogenic fires (to support agricultural activities) and encroachment drive deforestation in Hill forests. The key drivers of degradation in addition to illegal felling and fuelwood collection are shifting cultivation, cattle-grazing and betelvine cultivation (BFD 2018).

In Sal forests, the main key drivers of deforestation are encroachment by industry and settlements, agricultural conversion (both commercial and subsistence), illegal and excessive harvesting, industrial use of fuelwood and infrastructure (e.g. roads). Degradation is largely and directly driven by illegal and excessive harvesting, fuelwood collection and encroachment (BFD 2018).

In Coastal forests, the direct drivers of deforestation include: illegal and excessive harvesting, shrimp farming, agriculture, infrastructure development (e.g. roads), fuelwood collection and natural disturbances (e.g. cyclones) (BFD 2018). The direct drivers of degradation include illegal and excessive harvesting, fuelwood harvesting and natural disturbances (BFD 2018).

In Sundarban, there is no deforestation due to anthropogenic causes. The key drivers of degradation are fuelwood harvesting, illegal harvesting, increasing salinity (which is related to canopy thinning through disease), reduced freshwater flows as result of water diversions, and natural disturbances (e.g. cyclones) (BFD 2018).

To reduce deforestation and degradation and address the direct and indirect drivers, several programs and strategies are being targeted at the national scale (Table 3). Furthermore, the national strategy for REDD+ where the key drivers of deforestation and forest degradation will be addressed is being designed. Up to this point, the policies and measures (PAMS) have been identified.

Through social forestry, coastal afforestation and reforestation programs of BFD, 84,378 ha and 68,830 km plantations have been raised from 1981-1982 to 2016-2017. These activities are taking place in forests and *'forest lands'.* The percent of protected area in Bangladesh has also increased from 1.81% (2013-14) to 4.19% in 2017 with the aim to reach 5% by 2020 (MoEFCC 2009, GED 2015). According to the 7th Five-Year Plan (2016-2020), the country aims to increase forest cover to 15% by 2020, which is consistent with the relevant targets of sustainable development goal (SDG), and the Environment Forestry and Climate Change Country Investment Plan (GoB 2017). Moreover, afforestation and reforestation in the coastal areas, islands and degraded areas are mentioned as climate change mitigation strategies and actions in the Bangladesh Climate Change Strategy and Action Plan (BCCSAP) (MoEFCC 2009, GED 2015). A brief description of activities undertaken by BFD to address the drivers of deforestation and forest degradation is in Appendix B.

Table 3: Potential deforestation and forest degradation reduction strategies in the recent national strategic plans and government policy document of Bangladesh.

Objectives	Examples	National targets by 2020
Deforestation reduction	• Conserve and increase the forests and tree cover [a] • Declaration and protection of reserved forests [b] • Continuation of the prohibition of the use of fuel wood in brick fields, and promotion of efficient use of energy like use of improved cooking stove • Co-management approach to safeguard the forest biodiversity [c]	• Increase of protected area from 1.81% (2013-14) to 5%[b] by 2020.
Reforestation/ Afforestation	• Continuation of coastal mangrove plantation • Plantation in the island areas of Bangladesh • Continuation of Social and Homestead forestry [a, d] • Intensification of plantation in coastal zone [b, d]	• 50,000 ha, 5,000 ha, 30,000 ha, 5,000 ha of land will be planted over the period of 2016 to 2020 in the hill forest, plain land forest, coastal areas, and reed lands of Sylhet region respectively. • Approximately, 20,000 km. of strip plantations will be established by 2020[b].
Forest restoration	• Reforestation and afforestation in the reserved forests [a] • Increase productive forest coverage • Increase tree density of the existing forests and older plantations through 'enrichment planting' and 'assisted natural regeneration' [b] • Scattered and denuded hill forests will be replanted to increase productivity [c]	• Increase of forest coverage from 13.20% (2013-14) to 15% [b] by 2020.
Source: [a](MoEFCC 2015), [b](GED 2015), [c](GED 2013), [d](MoEFCC 2009)		

3. Elements of forest reference level/forest reference emission level

3.1 Forest definition

When Bangladesh reporting to FAO FRA (FAO 2015) and to the UNFCCC (MoEFCC 2012), it follows the following forest definition: *"Land spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10 percent, or trees able to reach these thresholds in situ. It does not include land that is predominantly under agricultural or urban land use".*

However, some vegetation types such as mangroves dominated by *Ceriops decandra* (local name: Goran) can hardly reach 2-2.5 meters height, but are considered as forests located in the Sundarban. The forest area covered by *Ceriops decandra* and other tree species is 24% of the Sundarban area (Rahman, Khan et al. 2015). Therefore, the forest definition used for the construction of FREL/FRL was adapted to include the forests area dominated by *Ceriops decandra*, and is as follows:

"Land spanning more than 0.5 hectares with trees higher than 5 meters **(exception for *Ceriops decandra* with height of 2 meters)** and a canopy cover of more than 10 percent (%), or trees able to reach these thresholds in situ. It does not include land that is predominantly under rural settlement, agricultural or urban land use; **trees within such areas are considered as non-forest trees**."

3.2 Pools and greenhouse gases (GHGs)

Carbon pools

The carbon pools considered are above-ground and below-ground biomass. Field data on above-ground biomass are collected through harmonizing the sub-national forest inventories conducted from 1997 to 2014 (Sola, Costello et al. 2016). The below-ground biomass pool is estimated using the default below-ground biomass to above-ground biomass ratio (R) obtained from 2006 IPCC Guidelines.

Carbon in deadwood, litter and soils are excluded from the construction of FREL/FRL due to lack of data in these pools at the national scale. Additionally, data available for deadwood, litter and soils in protected areas indicate they are relatively low in carbon compared to above- and below-ground biomass having 0.86 Mg/ha (0.4% of the total), 6.7 Mg/ha (3%) and 31 Mg/ha (13%) respectively (Latif, Chowdhury et al. 2015). Changes in these pools are also likely to be modest compared to above-ground biomass pool. Nonetheless, field data on soil, deadwood and litter are currently being collected through the ongoing forest inventory of Bangladesh (BFI), and will be considered in future submissions.

Greenhouse gases

CO_2 is the only greenhouse gas (GHG) included for the construction of FREL/FRL due to lack of national data for other gases.

Methane (CH_4) is emitted from clearance and conversion of peat land as well as extraction of peat (Brown, Humphreys et al. 2014). In Bangladesh, peatland occupies 1.6 % of the total land area and more importantly, peat is not extracted in the country (Masud, Moniruzzaman et al. 2011, MoEFCC 2016). Hence, CH_4 emissions from peat land are not considered for this submission.

Other non-CO_2 GHGs are emitted from forest fires (IPCC 2006). The Bangladesh - Global Forest Resources Assessment (FRA) – Country Report (2015) suggests that on average 16,473 ha of forest were burnt annually from 2003 to 2012 (FAO 2015). However, there is no other national document that can verify the FRA (2015) data. The FRA (2015) data are based on the Moderate Resolution Imaging Spectroradiometer (MODIS) pixels, which are prone to systematic over-or underestimation because of the MODIS pixel size limitation to detecting truly fine- scale change. In addition, the MODIS definition of woody vegetation includes areas that are not forest as per the FAO forest definition (van Lierop, Lindquist et al. 2015). The forest area burned data is not representative of the country context based on the forest definition.

Moreover, the area reported in the FRA report mainly covered the shifting cultivation that occurs in the Chittagong Hill Tracts (CHT). Most of the hills in CHT, where shifting cultivation is being practiced are denuded and covered by herbs and small shrubs. The fire which occurs in CHT cannot be characterized as forest fire, rather ground fire used for shifting cultivation. In Bangladesh, it is difficult to distinguish between natural and anthropogenic forest fires and obtain accurate data on forests affected by shifting cultivation. For these reasons, non-CO_2 emissions from forest fires are not included in this FREL/FRL submission.

3.3 REDD+ activities

3.3.1 Included REDD+ activities

The proposed FREL/FRL includes the following REDD+ activities defined below.

Deforestation: A land use change due to conversion from forest to non-forest land classes (Table 4). The land classes are defined based on the national land cover maps and the national land representation system following the forest definition described in Section 3.1.

Forest degradation: a reduction in the carbon stock within forest land classes, approximated by a decrease in tree cover percentage (Table 4).

- **Degradation low**: is defined by a decrease of tree cover percentage between 5 and 25% within forest land classes.
- **Degradation high:** is defined by a decrease of tree cover percentage greater than 25% within forest land classes.

Enhancement of forest carbon stocks defined by one of the separate activities below (Table 4)**.**

- **Afforestation and reforestation**: A land use change due to conversion from non-forest to forest land classes. The land classes are defined based on the national land cover maps and the national land representation system following the forest definition described in Section 3.1.
- **Forest restoration**: an increase in the carbon stock within forest land classes, approximated by an increase in tree cover percentage.
  - **Restoration low:** is defined by an increase of tree cover percentage between 5 and 25% within forest land classes.
  - **Restoration high**: is defined by an increase of tree cover percentage greater than 25% within forest land classes.

Table 4. Matrix of REDD+ activities which were defined in Bangladesh's FREL/FRL.

Area (ha)		2015	
		Forest	**Non-forest**
2000	**Forest**	Forest degradation and/or Forest restoration	Deforestation
	Non-forest	Enhancement	Impact of trees outside forest (not included in the FREL/FRL)

3.3.2 Excluded REDD+ activities

Conservation of forest carbon stocks and sustainable management of forests are not defined or used as activities in Bangladesh's FREL/FRL. However, the activity data are based on wall-to-wall maps and therefore, forest activities associated with "Conservation of forest carbon stocks" and "Sustainable management of forests" are captured under the REDD+ activities which are defined above. Consequently, the relevant emissions and removals that derive from "Conservation of forest carbon stocks" and "sustainable management of forests" are accounted for the proposed FREL/FRL.

Timber extraction is only followed under the "social forestry" programme by the BFD in Bangladesh. Under this social forestry program, a benefit-sharing mechanism is in place, under which the sales revenue of timber is shared between the participants and BFD. Logging is practiced with a rotation of 10 to 15 years. After logging, the area is planted again under the supervision of BFD. Because of equal rotation, the net emissions is supposed to be zero. Besides, "sustainable forest management" is not clearly defined in the country because of lack of standard, guidelines and protocols. Hence, "sustainable management of forests"

is not defined or used in this submission. The conservation of forests is important in Bangladesh and is reflected in National planning documents (GED 2015). The country aims to transparently report the impact of forest conservation on GHG emissions and removals. However, "conservation of forest carbon stocks" is not defined or used in this submission, because the delineation of reserved, protected acquired and vested forests is incomplete at the national level. The expected results and future possible framework development on sustainable forest management will allow the consideration of "conservation of forest carbon stocks" and "sustainable management of forests" in the future submissions.

3.4 Scale of forest reference level/forest reference emission level

Under this submission, FREL/FRL is reported at the national level with segregated values for the five zones (hill, sundarban, sal, coastal and village). Activity data, emissions and removals of GHG associated with the REDD+ activities (reducing emissions from deforestation, reducing emissions from degradation and enhancement of forest carbon stocks) differ between zones. Therefore, results are reported both at the zone and national scale to increase transparency and improve understanding about how REDD+ sub-national and national activities, impact forests in each zone.

4. Data and construction approach

4.1 Activity Data

The national land cover maps 2000 (GoB 2017) and 2015 (GoB 2017) are the only sources of spatial information that give estimates of forest land area based on the forest definition as described in Section 3.1. The area of forest land remaining as forest land, other land converted to forest land and forest land converted to other land are calculated using the national land cover maps 2000 and 2015. While the maps are developed using different methods because of the difference of satellite image availability, the same classification system is used to describe the different land classes and ensure the consistency between the two maps (Section 4.1.3). The National land cover map 2015 is presented first because it is based on very high-resolution satellite images and was used, along with coarse resolution images to create the national land cover map 2000.

4.1.1 National land cover map 2015

Multi-spectral ortho (Level 3) SPOT6/7 images of 6-meter spatial resolution with maximum 10% cloud coverage are used for the whole country. To delineate some land classes with temporal variability (e.g., single and multiple crops) Landsat 8 and Sentinel 2 images are used. Land cover mapping is done separately for each of the 64 districts. For SPOT image classification, the Object-Based Image Analysis (OBIA) technique is adopted to create polygons (i.e., image objects) defined by spectral, spatial, contextual, and hierarchical properties. The multi resolution segmentation algorithm is used to develop image objects using the bands green, red and NIR with equal weights as input layers. The image objects developed are used as the basic unit of classification and land cover code is assigned to each segment.

Quality checking is an integral part of the development of geospatial databases , and includes topology, attribute, and consistency checks (Franceschini, Jalal et al. 2016). The accuracy assessment analysis is designed using a pseudo-ground truth validation technique, with a stratified random sampling by district and land class (Tasnim, Franceschini et al. 2017). Sample numbers for each of the land classes within a district are chosen based on the district size and the relative occurrence (in terms of area) of the land class in the district. The legend of the national land cover map 2015 has 33 land classes (Figure 2) out of which 9

are forest land classes. All classes are harmonized with the classification system prepared for the national land cover map 2000 (Table 6, Table 7), which is less detailed because of the lower resolution of the images in 2000. The methodology and the process for the preparation of the national land cover map 2015 is detailed and well documented (Islam, Iqbal et al. 2016, GoB 2017, GoB 2017).

Table 5: Area (in hectares) of land classes at the zone and national level in 2015.

	Land classes	Forest/ Non-forest	Area in hectares (ha) in 2015					
			Coastal	Hill	Sal	Sundarban	Villages	National
1	Forest Tree Dominated Area (Terrestrial)	Forest	1,623	727,004	23,360		16,853	768,841
2	Mangrove Forest	Forest	2,292			399,725	171	402,187
3	Mangrove Plantation	Forest	53,948				1,141	55,089
4	Plain Land Forest (Sal Forest)	Forest		149	17,073		1,696	18,918
5	Rubber Plantation	Forest		19,843	3,203		639	23,685
6	Forest Tree Dominated Area (Aquatic/ Regularly Flooded)	Forest					769	769
7	Orchards and Other Plantations (Trees)	Non-forest	262	4,530	29,255		146,652	180,699
8	Herb Dominated Area	Non-forest	5,025		1,392	1,004	58,004	65,425
9	Herbaceous Crops	Non-forest	229,353	127,590	221,946		6,591,982	7,170,870
10	Mud Flats or Intertidal Area	Non-forest	61,168	9		1,744	13,380	76,301
11	Non-vegetated	Non-forest	36,306	50,882	69,464	712	726,403	883,767
12	Rivers and Khals	Non-forest	478,751	10,708	6,688	228,201	529,160	1,253,507
13	Rural Settlement	Non-forest	118,284	83,520	159,188		2,763,442	3,124,434
14	Swamp Reed Land	Non-forest					13,437	13,437
15	Shrubs with scattered trees	Non-forest	4,040	691,921	2,864		20,248	719,072
	National		991,051	1,716,157	534,433	631,386	10,883,974	14,757,000

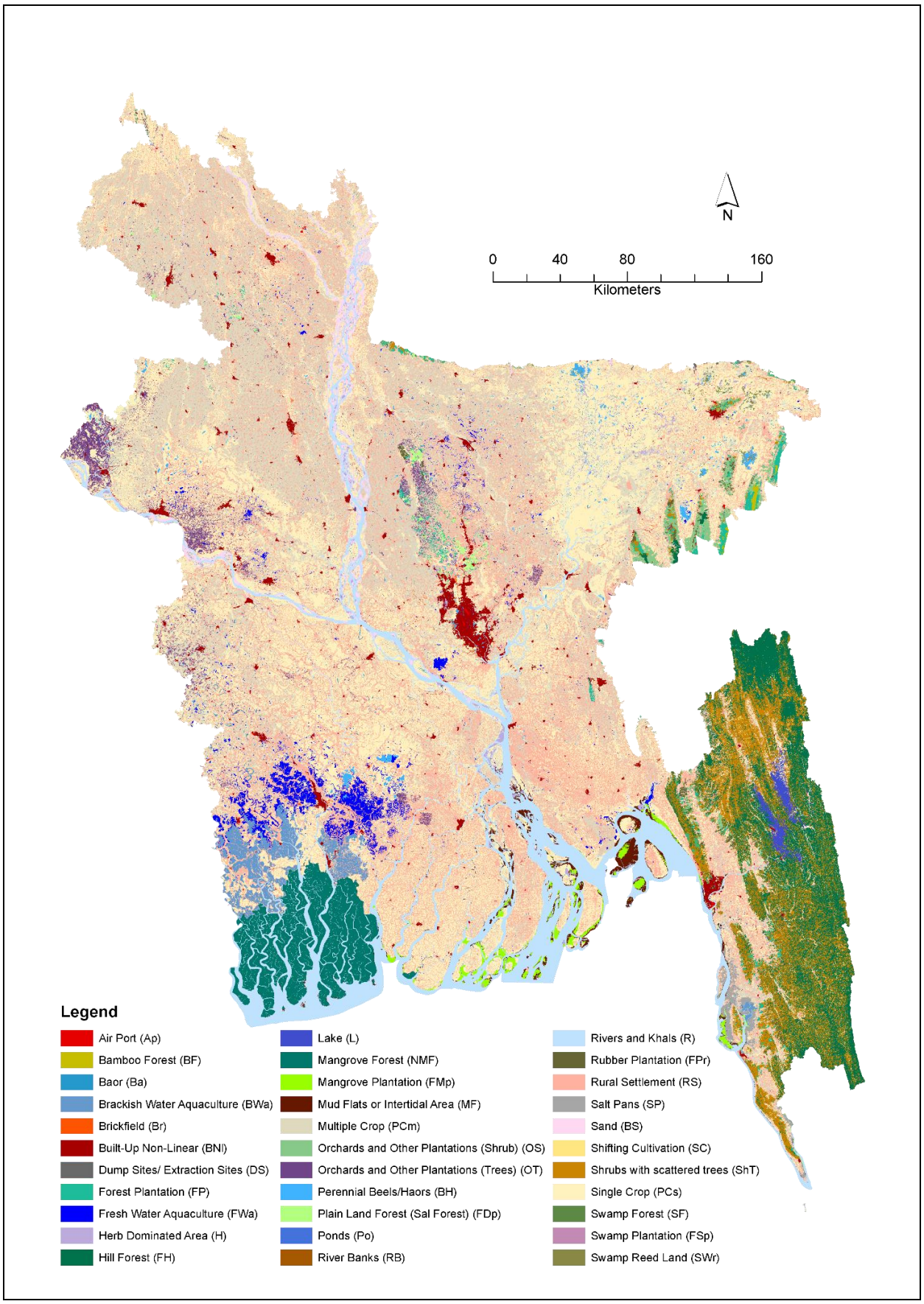

Figure 2: National Land Cover map 2015 (GoB 2017)

4.1.2 National land cover map 2000

The national land cover map 2000 is prepared using cloud free LANDSAT imagery which has a spatial resolution of 30m (GoB 2017). More specifically, the images were multi-spectral LANDSAT 5 TM and LANDSAT 7 ETM acquired between February and March of 2000. The national land cover map 2015, prepared from SPOT 6/7 images, is overlaid on the Landsat images of 2000, and the boundaries of the land classes of 2015 are edited based on visual interpretation of the Landsat images of 2000. The legend of land classes for the national land cover map of 2000 are prepared using the NLRS of Bangladesh and taking into consideration of the spatial and spectral resolution of Landsat image (GoB 2017). The national land cover map 2000 has 24 land classes (Figure 3) out of which 6 are forest land classes (Table 6).

Table 6: Area (in hectares) of land classes at the zone and national level in 2000.

	Land classes	Forest/ Non- forest	Area in hectares (ha) in 2000					
			Coastal	Hill	Sal	Sundarban	Villages	National
1	Forest Tree Dominated Area (Terrestrial)	Forest	165	806,589	17,525		6,254	830,532
2	Mangrove Forest	Forest	2,503			400,112	85	402,700
3	Mangrove Plantation	Forest	61,719			4	1,096	62,818
4	Plain Land Forest (Sal Forest)	Forest		157	20,767		1,939	22,864
5	Rubber Plantation	Forest		10,038	1,990		338	12,367
6	Forest Tree Dominated Area (Aquatic/ Regularly Flooded)	Forest					798	798
7	Orchards and Other Plantations (Trees)	Non-forest	515	36	27,748		64,982	93,280
8	Herb Dominated Area	Non-forest	22,935	4	1,088	3,015	32,033	59,076
9	Herbaceous Crops	Non-forest	242,099	122,209	239,125	8	6,968,673	7,572,113
10	Mud Flats or Intertidal Area	Non-forest	49,400			6,113	5,007	60,520
11	Non-vegetated	Non-forest	25,395	53,936	44,700	1,284	567,021	692,336
12	Rivers and Khals	Non-forest	471,587	7,040	4,887	220,849	451,874	1,156,237
13	Rural Settlement	Non-forest	109,608	74,804	166,043		2,738,201	3,088,657
14	Swamp Reed Land	Non-forest					14,311	14,311
15	Shrubs with scattered trees	Non-forest	5,125	641,344	10,559		31,363	688,390
	National		991,051	1,716,157	534,433	631,386	10,883,974	14,757,000

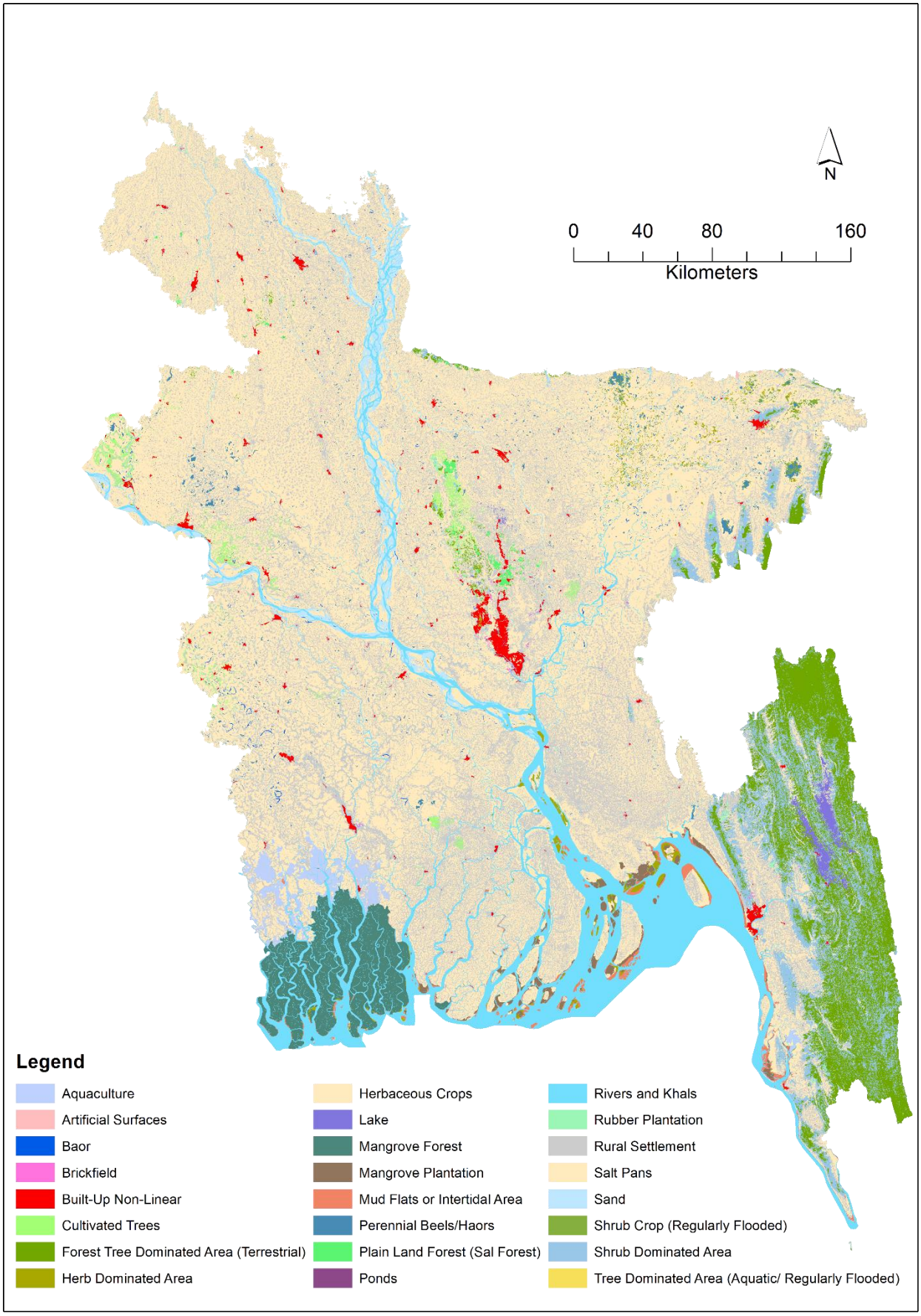

Figure 3: National Land cover map 2000 (GoB 2017)

4.1.3 Harmonization of Land Cover Map 2015 and 2000

Due to the lower resolution of the national land cover map of 2000 and different number of classes in both maps, steps were taken to harmonize the two maps and facilitate historical land cover change assessment. The national land cover map 2015 detects 17 out of 24 classes of the national land cover map 2000, while the remaining classes were aggregated to 7 higher level classes using the NLRS and LCCS (Table 7). The classes of 'Hill Forest', 'Bamboo Forest', 'Forest Plantation' of the national land cover map 2015 were aggregated into one class named 'Forest Tree Dominated Area (Terrestrial)' for the national land cover map 2000. The classes of 'Shrubs with scattered trees', 'Orchards and Other Plantations (Shrub)' and 'Shifting Cultivation' of the national land cover map 2015 were aggregated in one class named 'Shrubs with scattered trees'. The land classes of 'Multiple Crop' and 'Single Crop' were aggregated in one class named 'Herbaceous crops'.

To further simplify the harmonization of these two maps, all the non-vegetated classes were grouped in one class named 'Non-vegetated' which includes the following classes: 'Aquaculture', 'Built-Up Non-Linear', 'Artificial Surfaces', 'Baor', 'Brickfield', 'Lake', 'Perennial Beels/Haors', 'Ponds', 'Salt Pans' and 'Sand'. The classes 'Mud Flats or Intertidal Area' and 'Rivers and Khals' remain as in 2015 to reflect the natural accretion and erosion activity and the consequential effects on forests. The resulting number of harmonized classes is 15 (Table 7).

Table 7: Harmonization between the land classes of the national land cover maps of 2015 and 2000.

	Classes of the national land cover map of 2015	**Classes of the national land cover map of 2000**	**Harmonized land classes used in the FREL/FRL**	**IPCC**
1	Hill Forest	Forest Tree Dominated Area (Terrestrial)	Forest Tree Dominated Area (Terrestrial)	Forest land
2	Bamboo Forest			
3	Forest Plantation			
4	Mangrove Forest	Mangrove Forest	Mangrove Forest	Forest land
5	Mangrove Plantation	Mangrove Plantation	Mangrove Plantation	Forest land
6	Plain Land Forest (Sal Forest)	Plain Land Forest (Sal Forest)	Plain Land Forest (Sal Forest)	Forest land
7	Rubber Plantation	Rubber Plantation	Rubber Plantation	Forest land
8	Swamp Forest	Forest Tree Dominated Area (Aquatic/ Regularly Flooded	Forest Tree Dominated Area (Aquatic/ Regularly Flooded)	Forest land
9	Swamp Plantation			
10	Orchards and Other Plantations (Trees)	Orchards and Other Plantations (Trees)	Orchards and Other Plantations (Trees)	Cropland
11	Herb Dominated Area	Herb Dominated Area	Herb Dominated Area	Grassland
12	Single Crop	Herbaceous Crops	Herbaceous Crops	Cropland
13	Multiple Crop			
14	Mud Flats or Intertidal Area	Mud Flats or Intertidal Area	Mud Flats or Intertidal Area	Wetland
15	Brackish Water Aquaculture	Aquaculture		
16	Fresh Water Aquaculture			
17	Built-Up Non-Linear	Built-Up Non-Linear		
18	Air Port			
19	Dump Sites/	Artificial Surfaces		

	Classes of the national land cover map of 2015	Classes of the national land cover map of 2000	Harmonized land classes used in the FREL/FRL	IPCC
	Extraction Sites		Non-vegetated	Other land
20	Baor	Baor		
21	Brickfield	Brickfield		
22	Lake	Lake		
23	Perennial Beels/Haors	Perennial Beels/Haors		
24	Ponds	Ponds		
25	Salt Pans	Salt Pans		
26	Sand	Sand		
27	River Banks			
28	Rivers and Khals	Rivers and Khals	Rivers and Khals	Wetland
29	Rural Settlement	Rural Settlement	Rural Settlement	Settlements
30	Swamp Reed Land	Swamp Reed Land	Swamp Reed Land	Wetland
31	Shrubs with scattered trees	Shrubs with scattered trees	Shrubs with scattered trees	Grassland
32	Orchards and Other Plantations (Shrub)			
33	Shifting Cultivation			

4.1.4 Calculation steps to generate activity data

The national land cover maps of 2000 and 2015 are overlaid to obtain **a land cover change map** in which each polygon contains:
- area in hectares (ha)
- land classes in 2000
- land classes in 2015
- BFI zone in which the polygon is located

This land cover change map covers the territory of Bangladesh entirely (wall-to-wall). It contains 1,976,910 polygons with an average polygon size of 7.47 ha.

Table 8: The first ten polygons of the attribute table of the land cover change map (2000-2015).

Polygon ID	Area (in hectares)	Land classes in 2000	Land classes in 2015	BFI zone
1	917	Rivers and Khals	Rivers and Khals	sundarban
2	1	Mud Flats or Intertidal Area	Rivers and Khals	sundarban
3	20,995	Rivers and Khals	Rivers and Khals	sundarban
4	2	Herbaceous Crops	Mangrove Forest	sundarban
5	0.01	Mangrove Forest	Mangrove Forest	sundarban
6	2,235	Mangrove Forest	Mangrove Forest	sundarban
7	0.1	Mangrove Forest	Mangrove Forest	sundarban
8	19	Mangrove Forest	Mangrove Forest	sundarban
9	730	Mangrove Forest	Mangrove Forest	sundarban
10	2,505	Mangrove Forest	Mangrove Forest	sundarban

The information of each polygon in the overlaid layer's attribute table can then be aggregated by summing the area for each category of land cover change for each zone, and summed again from zone to national level over the 15 years period:

$$AD_{i,j} = \frac{\sum_i^n (area_{i,j,k})}{15} \qquad \text{(Equation 1)}$$

where

$AD_{i,j}$: the activity data - i.e. the area in ha/year - changing from the land class **i** in 2000 to **j** in 2015

n the number of polygons following this change

$area_{i,j,k}$: the area (ha) of each polygon k following this change

4.2 Emission and removal factors

The emission and removal factors associated with land cover changes are calculated considering the above-ground biomass stocks per land class, as well as the tree cover change for the period 2000-2015. The different steps involved in this calculation are as follows:

- Step 1: Estimation of the above-ground and below-ground biomass (in ton biomass per ha) for the main forest land classes are based on the 15 harmonized land classes based on the NLRS National (Table 7). These estimates are derived from the analysis of past forest inventories conducted at sub-national and national level. Weighted average is used considering the size of the forest inventory plots.

-Step 2: Integration of the tree cover map 2000-2014 with the land cover change map to assess the percent of tree cover in 2000 and in 2015 for each polygon of the land cover change map.

-Step 3: Estimation of the weighted average percent of tree cover per land class, and calculation of the average biomass per percent of tree cover for each class of the land cover map.

- Step 4: Estimation of the carbon stock in 2000 and in 2015 for each polygon of the land cover change map as the product of percent tree cover and average biomass per percent tree cover.

- Step 5: Calculation of the emission and removal factors as the difference between the carbon stock in 2000 and in 2015.

4.2.1 Above-ground and belowground biomass estimates

Country-specific above-ground biomass carbon stocks of the land classes are obtained from previous six national and sub-national forest inventories that were conducted in the five zones between 1997 and 2014 (Table 9). Historical inventory data were harmonized for forest biomass estimation. The harmonization process was carried out in multiple stages, the complexity of which depended on the original format of the data and the condition of the data in terms of data entry or collection errors. A detailed description of the methodology which was followed to harmonize the nationally available forest inventory data can be found in the study conducted by Sola, Costello et.al (2016).

Table 9: National and sub-national forest inventories conducted between 1997 and 2014 (Sola, Costello et al. 2016).

Year	Title	BFI zones covered	Number of plots
1997	Forest Resources inventory reports for sundarban, coastal and hill forests	sundarban, coastal and hill	4786
2001	Forest Inventory of the Sal Forests of Bangladesh	sal	3693
2007	National Forest and Tree Resources Assessment 2005 -2007	Bangladesh, all the zones	251
2009	Sundarban Carbon inventory	sundarban	150
2010	Forest Carbon Inventory at six Protected Areas (PAs) in Bangladesh	Protected areas in the hill and sal zone	300
2014	Forest Carbon Inventory at eight Protected Areas (PAs) in Bangladesh	Protected areas in the hill Zone	213

These inventories are grouped together to present a more complete assessment of Bangladesh's biomass per land class and reduce the uncertainties by considering more data into the data analysis. Tree height and wood density when not recorded were estimated with a nationally developed tree height diameter relationship and international wood density database. The pantropical allometric equation developed by Chave et al. (Chave, Réjou-Méchain et al. 2014) was used to estimate tree aboveground biomass:

$$agb = 0.0673 * (dbh^2 * h * wd)^{0.976} \quad \text{(Equation 2)}$$

where

agb: the tree aboveground biomass in kg

dbh: the tree diameter at breast height in cm

h: the tree total height in m and

wd: the wood density in g/cm³

The above-ground biomass of all trees within a plot were summed to plot level and then averaged by land class. The outcome of this study has generated weighted values of above-ground biomass stock (w_agb_class) considering the plot size (Table 10). This reflects that the estimation of historical emissions and removals is based on the assumption that the carbon stocks of each class remain the same over the reference period.

Table 10: Mean above-ground biomass (agb in ton/ha) per land class (Sola, Costello et al. 2016)

	Land classes used in the FREL/FRL	Number of plots	w_agb_class (ton/ha)	Confidence interval (95%)
1	Orchards and Other Plantations (Trees)	162	44.676	12.434
2	Forest Tree Dominated Area (Terrestrial)	4765	55.198	2.178
3	Herb Dominated Area	11	6.22	8.633
4	Mangrove Forest	149	95.199	11.185
5	Mangrove Plantation	513	43.424	2.766

	Land classes used in the FREL/FRL	Number of plots	w_agb_class (ton/ha)	Confidence interval (95%)
6	Plain Land Forest (Sal Forest)	1708	61.479	3.265
7	Rubber Plantation	7	36.03	11.664
8	Rural Settlement	697	27.493	2.889
9	Shrubs with scattered trees	22	9.316	6.656

The above-ground biomass stock of 'Tree Dominated Area (Aquatic/ Regularly Flooded)', 'Swamp Reed Land' and 'Herbaceous Crops' were considered zero, as there were no historical data available from previous inventories. Also, the above-ground biomass stock of 'Mud Flats or Intertidal Area', 'Non-vegetated', 'Rivers and Khals' were considered zero.

4.2.2 Integration of tree cover 2000-2014 maps

The entire Landsat archive for Bangladesh was used to derive nationally consistent input time-series data. Using Landsat data for the year 2000, pixels with greater than 50% tree cover were mapped to create a dataset ">50% tree cover extent stratum" (Potapov, Siddiqui et al. 2017). This >50% tree cover extent stratum map guided the change detection for the 2000 - 2014 time interval (Figure 4). A "gross tree cover loss stratum" was defined as pixels with greater than 50% tree cover in the year 2000 that lost tree cover from 2000 to 2014 (even if they gained tree cover by the year 2014).

A "gross tree cover gain stratum" was defined as pixels outside the year 2000 ">50% tree cover extent stratum" that increased canopy cover above 50% by the year 2014. The gross tree cover loss and gain stratum maps were produced independently. Wall-to-wall Landsat based tree cover extent and change maps were created.

For each polygon of the land cover change map zonal statistics of 2000-2014 tree cover (TC) change data were computed. This results in each polygon of the map containing the number of pixels with tree cover in 2000, the number of pixels with gains and the number of pixels with tree cover loss for each year between 2001 and 2014. The tree cover change was calculated for each polygon as the number of pixels with trees divided by the total number of pixels. The tree cover of 2015 was calculated by subtracting the total annual tree cover losses (2001-2014) from the tree cover of 2000 and adding the total tree cover gains obtained during the period 2001-2014.

$$TC_{2015\ i} = TC_{2000\ i} - TC_{loss_{2001-2014}} + TC_{gain_{2001-2014}} \quad \text{(Equation 3)}$$

Where

$TC_{2015\ i}$: percentage (%) of tree cover of polygon i, in 2015

$TC_{2000\ i}$: percentage (%) of tree cover of polygon i, in 2000

$TC_{loss_{2001-2014}}$: total annual percentage (%) of tree cover loss of polygon i from 2001 to 2014

$TC_{gain_{2001-2014}}$: total percentage (%) of tree cover gain of polygon i from 2001 to 2014

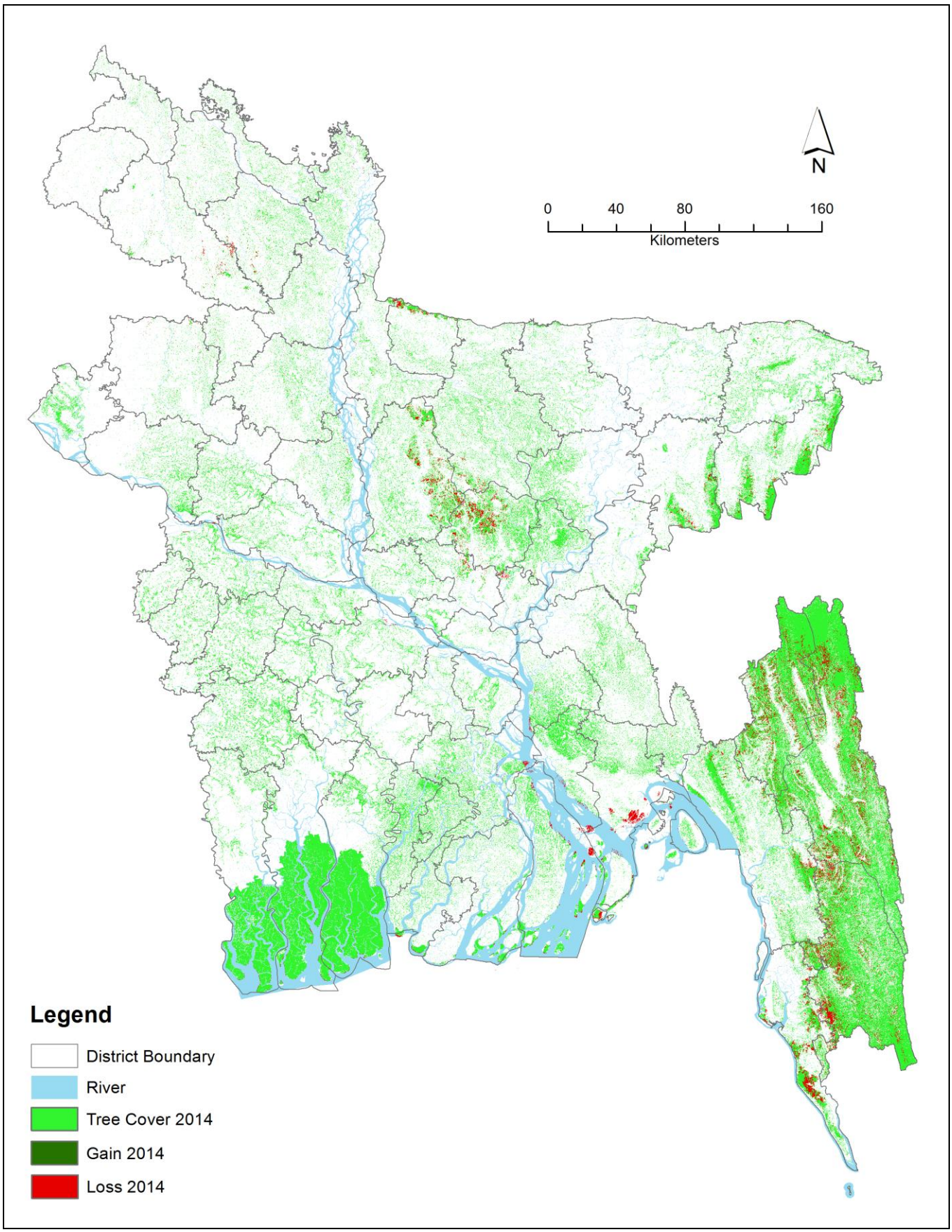

Figure 4 Tree cover change map 2000-2014 (Potapov, Siddiqui et al. 2017).

Each polygon of the integrated land cover change map and tree cover change contains the following information:
- area in hectares (ha)
- land class in 2000
- land class in 2015
- BFI zone in which the polygon is located
- percentage (%) of tree cover in 2000
- percentage (%) of tree cover in 2015.

4.2.3 Average percentage tree cover and average biomass per percent tree cover

With the information at the polygon on land class and tree cover percentage, the average percentage (%) of tree cover (avg_ptc) per land class was calculated as weighted average percentage (%) of tree cover (w_avg_ptc) of each polygon and their area, as follows:

$$avg\_ptc = \frac{\sum_i^n (area_{2000_i} \times ptc_{2000_i}) + \sum_i^m (area_{2015_i} \times ptc_{2015_i})}{(\sum_i^n area_{2000i}) + (\sum_i^m area_{2015i})} \quad \text{(Equation 4)}$$

Where,

w_avg_ptc: weighted average percentage (%) of tree cover per land class
$area\_2000_i$: area (ha) of polygon **i** in 2000
ptc_2000_i percentage (%) of tree cover of polygon **i** in 2000
$area\_2015_i$: area (ha)of polygon **i** in 2015
ptc_2015_i percentage (%) of tree cover of polygon **i** in 2015
n: number of polygons of a land class in 2000
m: number of polygons of a land class in 2015

Table 11 shows the weighted average percentage (%) of tree cover per land class used in the FREL/FRL.

The average above-ground biomass (t/ha) per percentage (%) of tree cover (agb_per_ptc) was calculated for each land class **i**

$$agb\_ptc_i = \frac{w\_agb\_class_i}{w\_avg\_ptc_i} \quad \text{(Equation 5)}$$

agb_ptc_i: above-ground biomass (t/ha) per percentage (%) of tree cover for a land class i
$w\_agb\_class_i$: weighted above-ground biomass (t/ha) for a land cover class i
$w\_avg\_ptc_i$: weighted average percentage (%) of tree cover for a land cover class **i**

Table 11: Weighted average above-ground biomass (w_agb_class), weighted average percentage of tree cover (w_avg_ptc) and above-ground biomass per percent tree cover (agb_ptc) of each of the harmonized FREL/FRL land use classes. NA: not available

	Land classes used in the FREL/FRL	**w_agb_class (ton/ha)**	**w_avg_ptc (%)**	**agb_ptc (ton/ha/%)**
1	Forest Tree Dominated Area (Aquatic/ Regularly Flooded)	-	44	0
2	Forest Tree Dominated Area (Terrestrial)	55.198	79	0.699
3	Herbaceous Crops	-	2	0
4	Herb Dominated Area	6.220	1	6.22
5	Mangrove Forest	95.199	94	1.013
6	Mangrove Plantation	43.424	62	0.7
7	Mud Flats or Intertidal Area	-	1	0
8	Non-vegetated	-	4	0
9	Orchards and Other Plantations (Trees)	44.676	28	1.596
10	Plain Land Forest (Sal Forest)	61.479	69	0.891
11	Rivers and Khals	-	1	0
12	Rubber Plantation	36.030	66	0.546
13	Rural Settlement	27.493	33	0.833
14	Shrubs with scattered trees	9.316	44	0.212
15	Swamp Reed Land	-	5	0

4.2.4 Emission and removal factors

Knowing for each polygon the land class in 2000 (i) and 2015 (j), the percentage (%) of tree cover in 2000 (ptc_{2000}) and 2015 (ptc_{2015}) and the average biomass per percent tree cover (agb_per_ptc), the emission or removal factor (efrf in tCO_2e/ha) for each polygon is calculated as follows in Equation 6:

$$efrf_{i,j} = ptc_{2000} \times agb\_per\_ptc_i - ptc_{2015} \times agb\_per\_ptc_j \times 1.2 \times 0.47 \times \frac{44}{12}$$

or

$$efrf_i = (ptc_{2000} - ptc_{2015}) \times agb\_per\_ptc_i \times 1.2 \times 0.47 \times \frac{44}{12} \qquad \text{(Equation 7)}$$

In Equation 6, the land class has changed between 2000 and 2015. In Equation 7, the land class remains the same. The below-ground biomass was calculated using the R ratio. The carbon fraction used was 0.47 (IPCC 2006)and the ratio C to CO_2 was 44/12.

Emission and removal factors are applied to each polygon. They can be averaged to land cover change classes (EFRF) by applying a weighted average:

$$EFRF_{i,j} = \frac{\sum_k^n \left(area_{i,j,k} \times efrf_{i,j,k}\right)}{\sum_k^n \left(area_{i,j,k}\right)} \qquad \text{(Equation 8)}$$

Where

n: number of polygons of class **i** in 2000 and **j** in 2015

k: number of polygons changing from a class **i** in 2000 to **j** in 2015

$area_{i,j,k}$: area of polygons that changed from a land class **i** in 2000 to land class **j** in 2015

$efrf_{i,j,k}$: emission/removal factors that result from a change of land class **i** in 2000 to land class **j** in 2015

4.3 Reference period

The reference period 2000-2015 was selected as the historical reference period for Bangladesh, since data are available for the years 2000 and 2015.

4.4 Construction method

Historical emissions and removals (ER in tCO_2e) for 2000 and 2015 are calculated based on the IPCC equation (AD x EFRF), and emission or removals per year (ER in tCO_2e/year) was obtained by dividing the difference between the two estimates by 15 (i.e. the reference period)

$$ER_{i,j} = \frac{(AD_{i,j} \times EFRF_{i,j})}{15} \qquad \text{(Equation 9)}$$

where,

ER : emissions or removals in tCO_2eq/year

AD : activity data in ha, and

$EFRF$: emission or removal factors in t CO_2e/ ha.

5. Proposed forest reference level

The proposed FREL of Bangladesh is 1,122,861 tCO_2e/year and FRL is -827,410 tCO_2e/year (Table 12). The net change is 295,451 tCO_2e/year. The FREL is made for deforestation and forest degradation while FRL is made for afforestation/reforestation and forest restoration.

Table 12: FREL and FRL (t CO_2e/year) at the zone and national level. The numbers within the parentheses are confidence interval (%).

BFI zones	**FREL**	**FRL**
	tCO_2e/year	**tCO_2e/year**
Coastal	49,587 (15)	-319,344 (61)
Hill	937,709 (23)	-401,697 (26)
Sal	109,285 (22)	-46,499 (33)
Sundarban	14,283 (34)	-27,846 (51)
Village	11,998 (24)	-32,018 (28)
National	1,122,861 (20)	-827,410 (28)

The average annual historical emissions due to **deforestation** in the period 2000-2015 has been estimated to be 778,448 t CO_2e/year at the national scale. About 90% (703,222 t CO_2 e/year) of the emissions have taken place in hill zone due to deforestation followed by coastal (6%), sal (2%) and sundarban (2%) zone

(Table 13). The largest proportion of deforestation was due to conversion of 'Forest Tree Dominated Area (Terrestrial)' to 'Shrubs with scattered trees'. Deforestation in the hill zone is mostly caused due to illegal felling, fuelwood collection, agricultural expansion including shifting cultivation practiced by commercial agriculture and ethnic groups (BFD 2018). Deforestation in coastal zone was due to conversion of 'Mangrove Plantations' to 'Herbaceous crops' and 'Rivers and Khals'. While deforestation in sal zone was due to conversion of sal forest for agriculture and settlements (Table 66). Most of the emissions from deforestation found in sundarban was due to natural disturbances (erosion) (Table 81).

The average annual historical emissions due to **degradation high** and **degradation low** was 217,209 and 127,204 tCO_2e/year respectively at the national scale (Table 13). Emissions from forest degradation were responsible for 31% (344, 413 tCO_2e/year) of the total emissions in the country during the period 2000 – 2015. Sixty-eight percent (234,487 tCO_2e/year) of emissions due to degradation occurred in the hill zone. This was followed by emissions in sal (28%), village (2%) and coastal (1%) zones. The largest source of emissions from degradation in the hill zone derived from 'Forest Tree Dominated Area (Terrestrial)' which was caused by illegal felling of trees and fuelwood collection (BFD 2018). Degradation in the sal and village zones was found in the 'Forest Tree Dominated Area (Terrestrial).

The average annual historical removals from **afforestation/reforestation** accounted for 48% (-399,775 tCO_2e/year) of the total removals at the national scale (Table 13). About 81% of removals (-322,738 tCO_2e/year) due to afforestation/reforestation was found in the hill zone. The largest proportion of removals was due to conversion of 'Shrubs with scattered trees' to 'Forest Tree Dominated Area (Terrestrial)'. This is due to the activities conducted by BFD including plantation and assisted natural regeneration. Natural regeneration of shifting cultivation areas is also increasing in some areas of hill zone.

The average annual historical removals due to **forest restoration** was -427,635 tCO_2e/year at the national scale (Table 13). About 81% (-345,532 tCO_2e/year) of this removal is accounted for by **restoration high** and 19% (-82,103 tCO_2e/year) by **restoration low.** About 65% of removals (-275,982 tCO_2e/year) due to forest restoration was found in the coastal zone. The largest amount of removals in the coastal zone occurred due to increased protection by BFD and assisted natural regeneration.

The average annual historical removals from **non-forest stable (trees outside forest)** was -490,239 tCO_2e/year at the national scale for the reference period 2000 - 2015. About 92% (-448,752 tCO_2e/year) of this removal is accounted for by removals from trees outside forest areas from the village zone. Therefore, in Bangladesh trees outside forest play a key role in carbon sequestration. However, in hill and sal zones, trees outside forests experiencing emissions (Table 13) due to increased demand for fuelwood and timber (BFD 2018).

Table 13: Emissions and removals (t CO_2e/year) from REDD+ activities at the zone and national level. The numbers within the parentheses are confidence interval (%).

	Emissions and removals (tCO_2e/year)						
BFI zones	**REDD+ activity**						**Non-forest stable***
	Deforestation	**Degradation High**	**Degradation Low**	**Enhancement**			
				Reforestation	**Restoration High**	**Restoration Low**	
Coastal	44,716 (16)	1,920 (44)	2,951 (57)	-43,362 (45)	-231,004 (83)	- 44,978 (38)	-79,951 (7)
Hill	703,222 (28)	124,279 (43)	110,208 (57)	-322,738 (29)	-57,193 (72)	-21,766 (32)	18,092 (6)
Sal	12,695 (20)	83,708 (28)	12,882 (36)	-10,586 (25)	-28,922 (52)	-6,991 (23)	23,694 (46)
Sundarban	14,042 (35)	23 (45)	218 (58)	-5,740 (69)	-15,942 (84)	-6,164 (38)	-3,258 (57)
Village	3,771 (19)	7,277 (38)	950 (33)	-17,348 (30)	-12,468 (58)	-2,202 (24)	-448,752 (1)
National	778,448 (26)	217,209 (35)	127,204 (51)	-399,775 (26)	-345,532 (60)	-82,103 (24)	-490,239 (2)
Emissions/Removals from non-forest stable (trees outside the forest) were not accounted for FREL/FRL							

6. Uncertainty Analysis

6.1 Uncertainty analysis of Activity Data

6.1.1 Sampling design

For the sampling design, a probability sampling protocol i.e., stratified random sampling was implemented. The activity classes determined from the map were used to construct strata. The following equations (Cochran 1977) were used to calculate an adequate overall sample size (n) for stratified random sampling. Overall sample size was found to be 952 and was distributed among the different strata considering 75 points as minimum sample size per strata is expected user accuracy of stratum i.

Table 14 shows the results and Figure 5 shows the distribution of accuracy assessment points on top of activity classes. As indicated in Table 14 the standard error of the estimated overall accuracy $S(\hat{O})$ and expected user accuracy EUA are user given. $S(\hat{O})$ was considered 0.01. Stable and rare classes (i.e., change classes) are expected to have high and low user accuracy, respectively (FAO 2016). Considering this, expected user accuracies for stable and change classes were assigned as 0.9 and 0.7, respectively.

$$n = \frac{(\sum W_i S_i)^2}{[S(\hat{O})]^2 + (\frac{1}{N}) \sum W_i {S_i}^2} \quad \text{(Equation 10)}$$

$$S_i = \sqrt{EUA_i * (1 - EUA_i)} \quad \text{(Equation 11)}$$

where,

- i is activity class
- N is number of units in the area of interest
- $S(\hat{O})$ is the standard error of the estimated overall accuracy,
- W_i is the mapped proportion of area of class i, and
- S_i is the standard deviation of stratum i,
- EUA_i is expected user accuracy of stratum i.

Table 14. Sampling design for the accuracy assessment of activity classes

Activity (i)	**Number of pixels (6m x 6m)**	**W_i**	**$S(\hat{O})^*$**	**EUA***	**S_i**	**W_iS_i**	**$W_iS_i^2$**	**Sample size**
Deforestation	86,759,444	0.021	0.01	0.7	0.458	0.010	0.004	75
Non-forest stable	3,662,592,149	0.893		0.9	0.300	0.268	0.080	427
Reforestation	69,305,011	0.017		0.7	0.458	0.008	0.004	75
Forest stable	218,129,291	0.053		0.9	0.300	0.016	0.005	75
Degradation Low	48,020,731	0.012		0.7	0.458	0.005	0.002	75
Degradation High	11,842,964	0.003		0.7	0.458	0.001	0.001	75
Enhancement Low	4,313,077	0.001		0.7	0.458	0.000	0.000	75
Enhancement High	1,321,359	0.000		0.7	0.458	0.000	0.000	75
	N = 4,102,284,026		$[S(\hat{O})]^2$ = 0.0001			$(\sum W_i S_i)^2$ = 0.095	$\sum W_i S_i^2$ = 0.096	n = 952

* User given

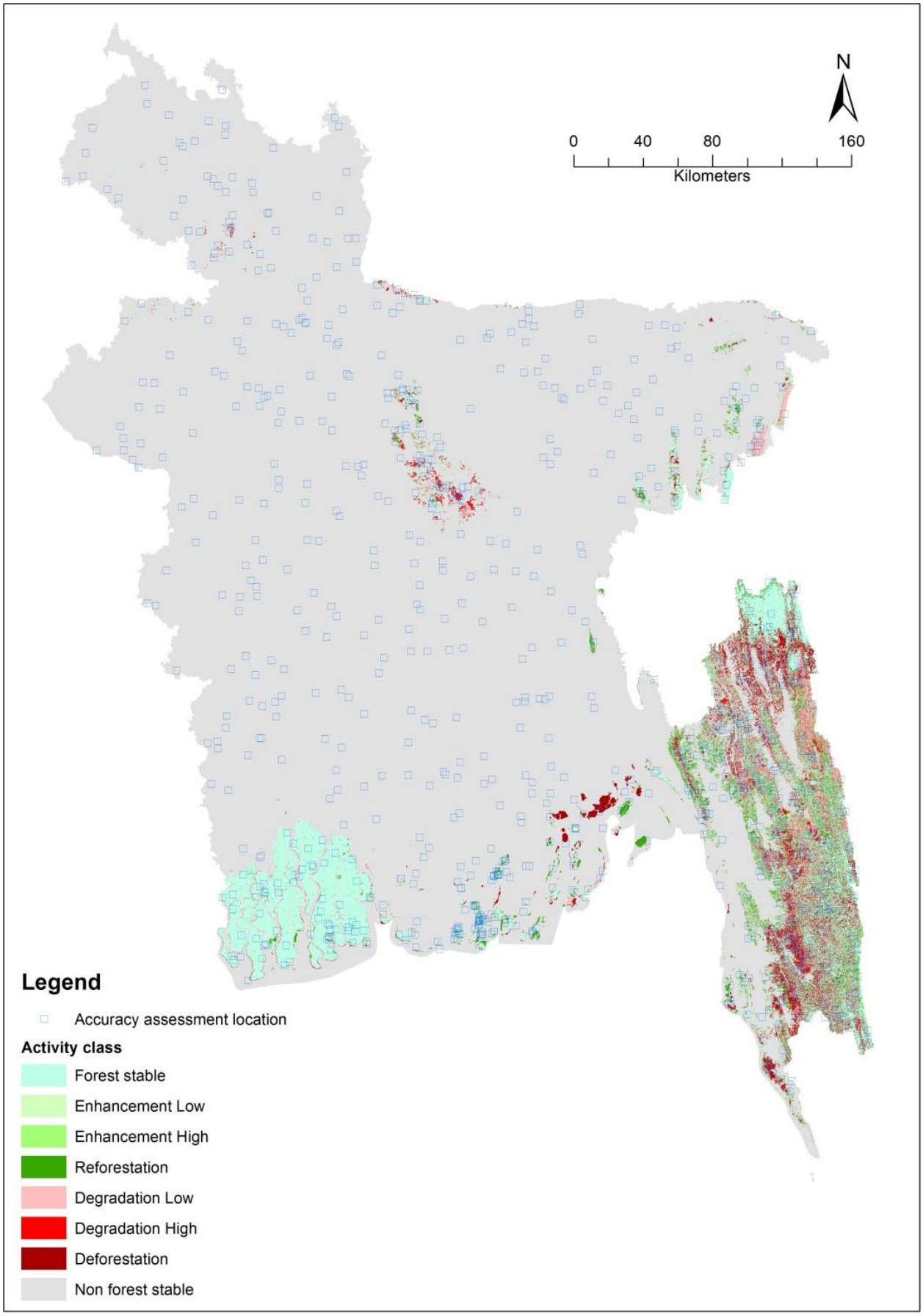

Figure 5: Distribution of accuracy assessment location over activity classes.

6.1.2 Response design

For the collection of reference data 30m by 30m spatial assessment unit was used at which the location-specific comparison of the reference classification and map classification was conducted. Google earth was used as primary source of reference data supplemented by time series Landsat data including Earth engine time-lapse (Figure 6) integrated with the Open foris collect earth (FAO 2016).

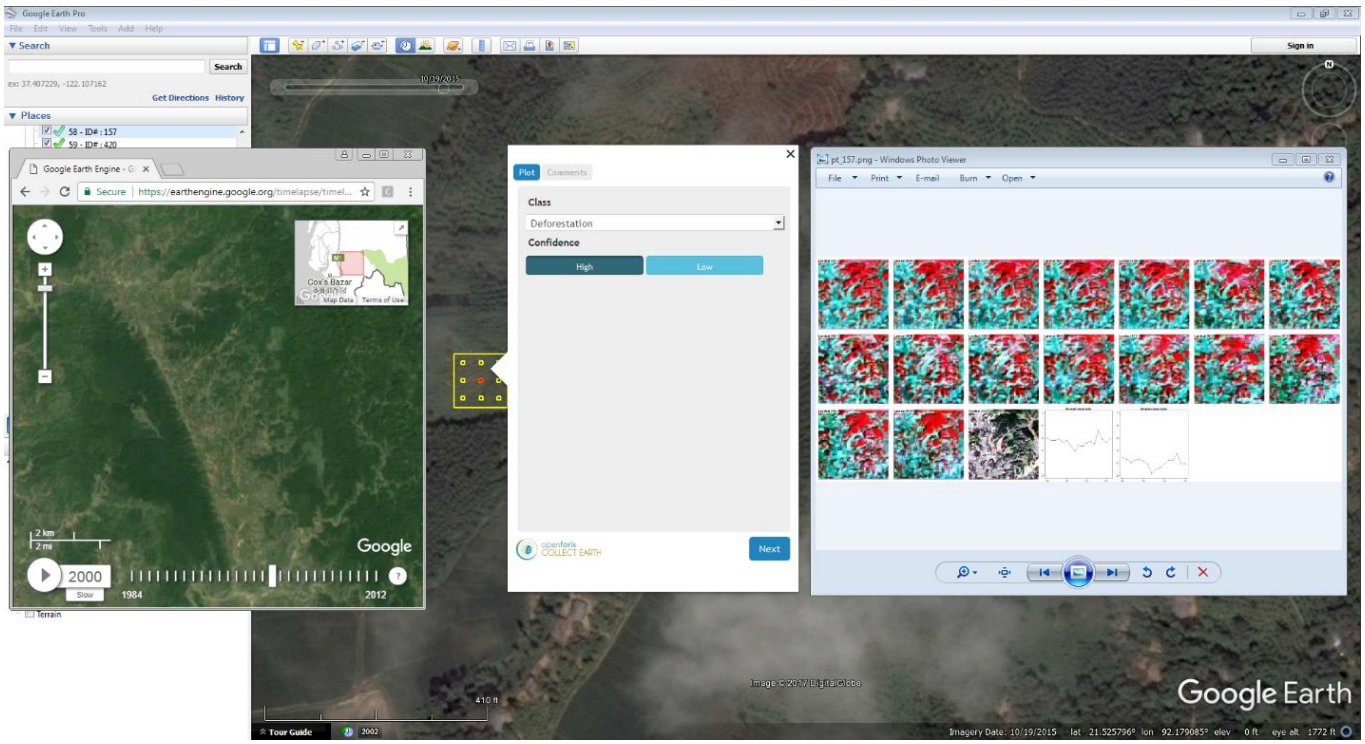

Figure 6: Reference data collection employing Open foris collect earth

6.1.3 Estimating accuracy and area

The overall accuracy of activity classification is found to be 0.687. Other accuracy measures (i.e., user's accuracy and producer's accuracy) are also derived from the error matrix (Table 15). These accuracy measures along with the area estimates with their respective 95% confidence intervals are reported in

Table 16.

Table 15: Error matrix of the uncertainty analysis

Reference class / **Map class**	Deforestation	Degradation High	Degradation Low	Enhancement High	Enhancement Low	Forest stable	Non-forest stable	Reforestation
Deforestation	31	4	3	2	6	9	18	2

Reference class / Map class	Deforestation	Degradation High	Degradation Low	Enhancement High	Enhancement Low	Forest stable	Non-forest stable	Reforestation
Degradation High	0	20	20	0	7	24	3	1
Degradation Low	0	8	25	4	6	28	4	0
Enhancement High	0	0	0	30	12	20	2	11
Enhancement Low	1	1	4	14	23	29	2	1
Forest stable	1	0	0	1	0	72	0	1
Non-forest stable	0	0	1	1	0	2	423	0
Reforestation	0	0	0	5	8	25	7	30

Table 16. Accuracy and area estimates for the activity classification

Activity	Accuracy		Area		
	Producer's accuracy	User's accuracy	Area estimate (ha)	Standard error (ha)	95% Confidence interval (ha)
Deforestation	0.939	0.413	139,857	20,725	40,620
Degradation High	0.606	0.267	46,622	10,479	20,539
Degradation Low	0.472	0.333	113,038	33,122	64,919
Enhancement High	0.526	0.400	80,307	34,191	67,014
Enhancement Low	0.371	0.307	74,955	14,493	28,406
Forest stable	0.344	0.960	1,020,652	51,439	100,821
Non-forest stable	0.922	0.991	13,161,316	64,147	125,728
Reforestation	0.652	0.400	120,252	18,619	36,493

6.2 Uncertainty analysis of Emission Factors

The uncertainty of the emission and removal factors derives from the confidence interval of the aboveground biomass estimates provided in Table 10. In each polygon of the spatial database a local emission and removal factor is given based on the aboveground biomass in 2000 and 2015. Confidence intervals are propagated using the formulas from the IPCC 2006 Guidelines chapter 3 on Uncertainty,

Utotal; $=\sqrt{U1^2 + U2^2 \quad + \cdots + Un^2}$ (Equation 12)

U_{Total}: The percentage uncertainty in the product of quantities (half the 95 percent confidence interval divided by the total and expressed as a percentage)

Ui: the percentage uncertainties associated with each of the quantities

$$Utotal = \frac{\sqrt{(U1*x1)^2+(U2*x2)^2 \ +\cdots+(Un*xn)^2}}{|x1+x2+\cdots+xn|} \quad \text{(Equation 13)}$$

Utotal: the percentage uncertainty in the sum of quantities (half the 95 percent confidence interval divided by the total and expressed as a percentage). This term uncertainty is based upon the 95percent confidence interval

X_1 and U_1: the uncertainty quantities and the percentage uncertainties associated with them respectively

Therefore:

- the confidence interval of polygon-based emission and removal factors was calculated from the confidence interval of each land cover AGB using the formula 3.2

- the confidence interval of the emission and removal factors aggregated by land cover change emissions was calculated from the confidence interval of the emission and removal factors of each polygon in each land cover change based on formula 3.2

- the confidence interval of the emissions and removals was calculated based on the confidence intervals of the area and emission and removal factors based on the formula 3.1.

- the confidence interval of the FREL and FRL were calculated from the CI of all the activities related with the formula 3.2.

7. National circumstances, future potentials and challenges

Bangladesh has experienced rapid economic growth over the last few decades (GED 2015). According to the World Bank (2017), the country's gross domestic product (GDP) grew by 7.1% in 2016. It was the sixth year in a row that GDP growth was greater than 6%. Most analysts expect this run to continue in the foreseeable future (World Bank 2017). Bangladesh's rapid economic growth has brought rapid development particularly in the infrastructure sector. For example, the GoB with the financial support from the Asian Development Bank (ADB) has recently started to implement the Chittagong-Cox's Bazar railway project. The development trend is likely to continue in the future with sustained economic growth which may bring negative impacts on LULUCF sector. A significant part of the infrastructure projects are expected to go through areas, for example, in Chattogram, Cox's Bazar districts that are currently forested (MoR 2016). Thus, these projects may cause deforestation and forest degradation in these areas. However, at this moment, it is difficult to say what extent of deforestation and forest degradation will be due to this project.

Apart from the developmental impacts as explained above, it is likely that population pressure will continue to impart negative impacts on forest and tree resources in the country. With 163 million people in 2016 (WorldBank 2017), Bangladesh is the 8th largest country in the world in terms of population. Moreover, it is one of the world's most densely populated countries with a population density of more than 1000 people per sq. km in 2016 (WorldBank 2017). The population growth is likely to continue in the future, meaning the population pressure on forests, land and other natural resources will intensify. Thus the level of scarcity of land is also likely to increase, which will intensify the land-use competition. In particular, more forest land is likely to be converted to agriculture, settlements, and industrial and urban areas to meet growing demand for food, housing, materials and so on induced by the increasing population.

In fact, how the population pressure can rapidly deplete tree and forest resources is demonstrated by the latest Rohingya refugee crisis that Bangladesh is facing since August 2017. According to reports by various organizations, about a million Rohingya people have fled to Bangladesh. For making shelters for these people, over 1200 ha (GoB estimate) of forests have been cleared in Coxes Bazar district. More forests are being cleared as the Rohingya people themselves collect fuelwood, in thousands of tonnes every day, for cooking from wooded land in area nearby their shelters.

In addition to the above, a significant amount of forested land is allocated by GoB for conversion to other land use purposes. According to BFD records, over 45,000 ha of coastal forest land is handed over to the Ministry of Land in 2014 mainly for conversion to agriculture. This kind of conversion increases pressure on remaining forests and thus enhances the risks of degradation and deforestation. In addition, forest land tenure conflicts in the CHT, and encroachment of forest land and boundary conflicts across the country enhance these risks.

While deforestation and forest degradation are common in some parts of the country, there is also the possibility of gain in tree and forest cover in other parts through plantations. Notably, coastal afforestation/reforestation, i.e. forest plantation in the coastal areas, offshore islands and newly accreted land, and social forestry are a priority of GoB[1] (MoEFCC 2009, MoEFCC 2015). The country has been investing significant amount of money from GoB's own budget and through financial support from development partners under different projects and programs to increase forest cover area. In Particular, Coastal afforestation/reforestation efforts significantly increase forest area each year. Likewise, significant area of fallow and marginal land (e.g. road sides and canal banks) as well as homestead and degraded land throughout the country is brought under plantations through the social forestry, and other projects and programs[2]. These afforestation/reforestation initiatives have been significant in the past and will continue to improve tree and forest cover in the country. Nevertheless, one has to remember that Bangladesh regularly experiences natural disasters like tropical cyclone, tidal surge, flooding, heavy torrential rain causing landslides in hilly areas, salinity intrusion, river bank erosion and reduced fresh water flow from upstream (MoEFCC 2009). These all have negative effects on productivity of forests and trees, and thus can limit or even diminish the positive impacts of afforestation and reforestation initiatives. Climate change is likely to exacerbate the occurrence and thus intensity of the negative impacts of natural disasters on forest and tree resources in Bangladesh in the future.

[1] In fact, Bangladesh is a pioneer country for coastal afforestation.

[2] The Climate Resilient Participatory Afforestation and Reforestation Project (CRPARP), completed in December 2016, is one of the most recent examples of such projects. Under this project, 17500 ha land in both coastal and hilly areas of Bangladesh was afforested and reforested. The project was jointly funded by the World Bank and GoB.

8. Transparent, accurate, complete, and consistent information

One of the key decision related to FRL/FREL (Decision 4/CP.15, paragraph 7) states that FRL/FREL should be established transparently, considering historical data, and adjust for National circumstances. Additionally, there is a clearly specified guideline stating that "the submissions should contain transparent, complete, consistent and accurate information"[3]. These criteria in the context of Bangladesh's FREL/FRL are discussed below:

Transparency

The data used for the construction of FREL/FRL are published on the Bangladesh Forest Information System (BFIS). BFIS is the national information system of BFD, under the Ministry of Environment, Forest and Climate change, for planning, implementing and monitoring forest management and conservation. The national land cover maps of 2000 and 2015 are published on the BFIS Geoportal. The country-specific emission factors are available on the forest emission factor database of BFIS and the tree cover data will be published on the BFIS Geoportal. The FREL/FRL data can be shared upon request with users based on the data sharing policy of BFD.

Accuracy

Accuracy assessment has been conducted for the activity data and emission factors used for the construction of FREL/FRL. The confidence interval of above-ground biomass stocks are shown in Table 16 . The accuracy assessment of activity data is described in section 6.1.3. Effort has been taken to ensure that the data and information is as accurate as possible by involving the academia offering forestry education in Bangladesh.

Completeness

Complete means the provision of information that allows for the reconstruction of FREL/FRL. The proposed FREL/FRL is based on national-level data that were disaggregated into the five zones of Bangladesh. Emissions and removals were provided at a zone and national level. In addition, all the information and data that was used for the development of FREL/FRL is provided in this report to allow reconstruction.

Consistency

The FREL/FRL has been prepared with the aim to maintain consistency with the LULUCF sector in the second (MoEFCC 2012) and third national communication (TNC). Both FREL/FRL and GHG inventory for the TNC considered CO_2 as the major gas and above-ground biomass as the major carbon pool. The FAO forest definition was used by the GHG inventory for the third national communications (ready for submission to UNFCCC) and the FREL/FRL used the same definition with slight modification. However, there are also some differences between the two reports. These differences are described below and in Table 17.

The forest definition that was used in the FREL/FRL does not include land that is predominantly under rural settlement, agricultural or urban land use. On the other hand, in the GHG inventory for the TNC, trees in 'village' land category with tree cover 30-70% or greater than 70% were considered as forest trees.

FREL/FRL is based on improved data recently developed and robust methodologies. The activity data of FREL/FRL are based on Landsat and SPOT-based maps of 2000 and 2015 respectively, while the GHG inventory for TNC is not based on geospatial data rather than on data published on various reports from

[3] UNFCCC, Annex to Decision 12/CP.17

various sources. In the FREL/FRL, improved emission factors were used considering data obtained from a national and sub-national forest inventories conducted by BFD (Tier 2). However, in the GHG inventory of second and third national communications default emission factors were used (Tier 1). In the FREL/FRL, emissions and removals were calculated from forest converted to other land, forestland remaining forestland and other land converted to forest while in the GHG inventory for TNC, CO_2 emissions were calculated from fuelwood removal, conversion of forest to other land use and soil carbon stock changes.

Therefore, data sources, reporting period, methods used for FREL/FRL differ from the latest GHG inventory published in the TNC. However, an update of the GHG inventory will be published with Bangladesh's first Biennial Update report (BUR) and fourth national communication and that this will be consistent with the FREL/FRL in terms of forest definition, emission factors, activity data and carbon pools.

Table 17: Differences between GHG inventory for third national communication and FREL/FRL for REDD+.

	LULUCF sector for TNC	**FREL/FRL for REDD+**
IPCC Guidelines	Mostly on the revised 1996 Guidelines	Only 2006 Guidelines
Time Period	GHG emissions and removals were considered for the period 2006 – 2012.	GHG emissions and removals were calculated at the national scale for the reference period 2000 - 2015
Forest definition	• Forest was defined as "land spanning more than 0.5 ha with more than 10% tree cover having trees attaining more than 5 m in height "(NFA 2005 – 2007) • it does not include land that is under 'Built-up area', 'Village', 'Cultivated land' and 'Inland water'. • Trees in the 'Village' category with tree cover 30-70%, greater than 70% were considered as forest trees.	• The NFA 2005-2007 definition was slightly modified to include goran species of Sundarban. • Forest was defined as "Land spanning more than 0.5 hectares with trees higher than 5 meters (exception for Goran species *Ceriops decandra* with height of 2 meters) and a canopy cover of more than 10 percent (%), or trees able to reach these thresholds in situ".
Land representation	Land representation includes one forest category for forest land along with the other classes. They are as follows: 1: forest land 2: cultivated land 3: village land 4: built-up area 5: inland water	The land representation in FRL includes 6 forest land classes along with other classes. Forest categories are as below: 1: Forest Tree Dominated Area (Terrestrial) 2: Mangrove Forest 3: Mangrove Plantation 4: Plain Land Forest (Sal Forest) 5: Rubber Plantation 6: Forest Tree Dominated Area (Aquatic/ Regularly Flooded
Activity data	The report is not based on geospatial data rather than on data published on various reports from various sources (secondary data).	FREL/FRL report used geospatial data. They are • National land cover maps 2000 (Landsat-based) • National land cover map 2015 (SPOT-based) • Tree cover change map 2000-2015
Emission	The report used the IPCC default values	Previous forest inventory data harmonized

	LULUCF sector for TNC	FREL/FRL for REDD+
factors	for the calculation of above ground biomass and carbon.	and were used to calculate the above ground biomass and carbon of the land cover classes (Tier 2).
Carbon pools	• Pools included are: above ground biomass and soil carbon pool. • Soil data of agro ecological zones are collected from 2 sources and used for soil emission reporting. • CO_2 emissions from soil carbon from all types of land-use is 3247 Giga grams CO_2	• Pools included in FRL are: above-and below-ground biomass. • Due to lack of forest soil data, Soil pool is not considered by the FREL/FRL report.
Gases	Carbon dioxide (CO_2) considered for reporting.	Carbon dioxide (CO2) considered for reporting.
Activities	• CO_2 emissions were calculated for the following activities: o fuel wood removal o conversion of forest land to other land o soil carbon stock changes	• GHG emissions and removals were calculated for the following REDD+ activities: o Deforestation: forest converted to other land o Forest degradation: forest land remaining forest o Afforestation/reforestation: Other land converted to forest o Forest restoration: forest land remaining forest
'Forestland' under the control of BFD	Areas of forest land differ because the TNC report used somewhat old figures.	Forestland areas are calculated recently, and the values reported in FRL have been updated.

9. Future improvement opportunities

Potential improvements in future FREL/FRL submissions will may include:

- Two national land cover maps are being developed for the years 2005 and 2010 but not ready at the time of the submission. They might be added to a modified submission to understand better the forest change trends over the 15-year period 2000-2015.
- Country-specific emission factors for soil, deadwood and litter are being collected from the ongoing Bangladesh Forest Inventory and will be included in the future improvements of FREL/FRL.
- Forest boundary delineation to support better estimation of the activity data for each zone is ongoing activity of BFD. Currently, BFD is involved in scaling up the boundary delineation with the support from several projects.
- 'Sustainable Forest Management' and 'Conservation' practice should be streamlined with set guidelines and certification to consider as 'REDD+ activity' for future FREL/FRL framing.
- Adoption of procedure/methods for considering non-CO_2 emissions from forest fires is being considered by the BFD.
- To institutionalize the REDD+ activities, a REDD+ unit in BFD has been proposed in the updated organogram which will be equipped with trained personnel and technology supports for regular

FREL/FRL computation, result generation and archiving of data during REDD+ piloting and results-based payment phase.

- Regular trainings would be carried out of BFD officials with the technical support of experts to build capability for activity data analysis and reporting for any period within and beyond the FREL/FRL reference, and result period.
- Suitable capacity building program will be carried out on forest monitoring and assessment, which will include remote sensing & GIS analysis and ground-based forest inventories.
- An update of the GHG inventory will be prepared with Bangladesh's first Biennial Update report (BUR) and that this will be more consistent with the FREL/FRL in terms of forest definition, emission factors, activity data, carbon pools etc. BFD will work closely with the Department of Environment to ensure consistency for the preparation of the upcoming BUR.

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11. Appendix

Appendix A: Schematic overview of the National land representation system of Bangladesh

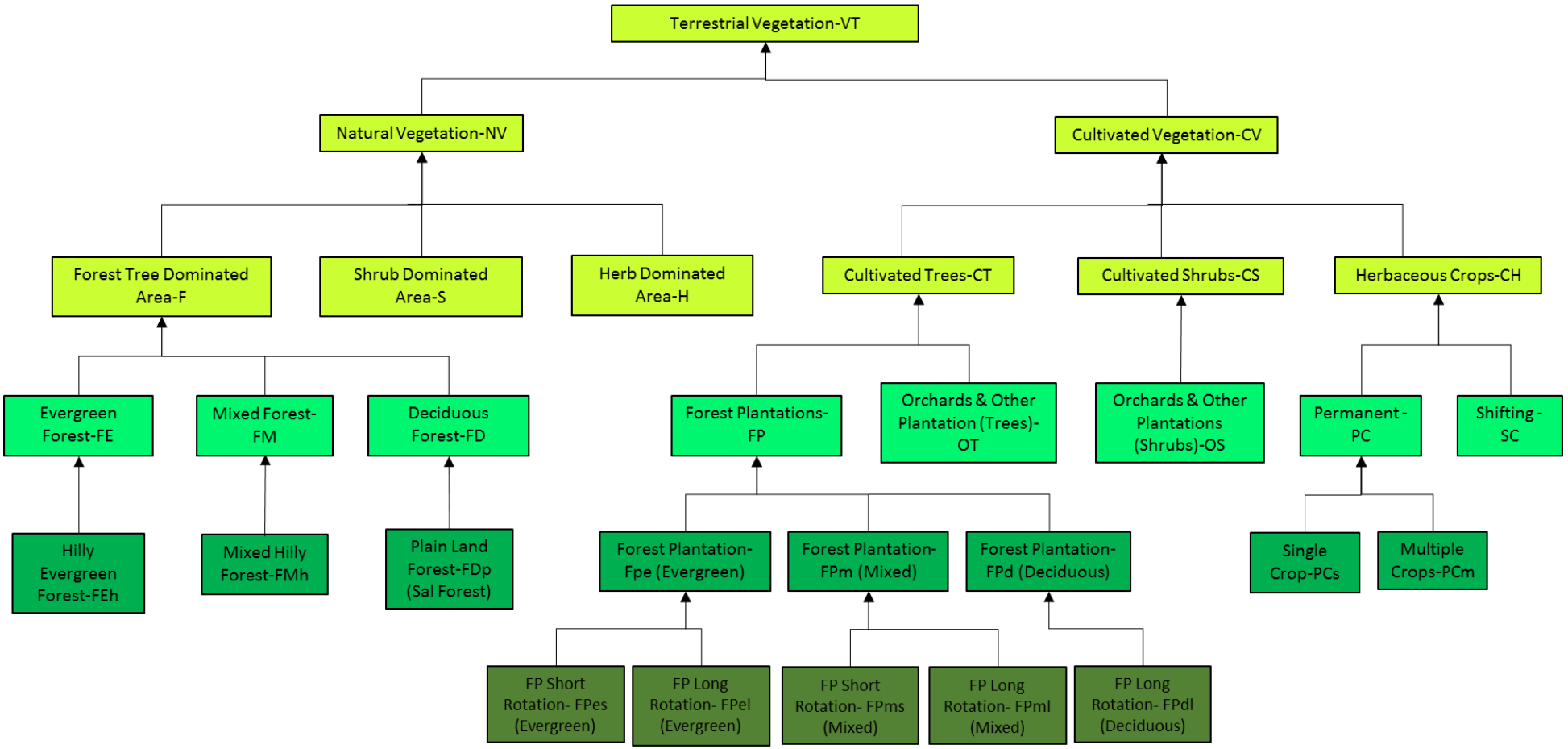

Figure 7: Schematic overview of the terrestrial vegetation land classes of the National land representation system of Bangladesh.

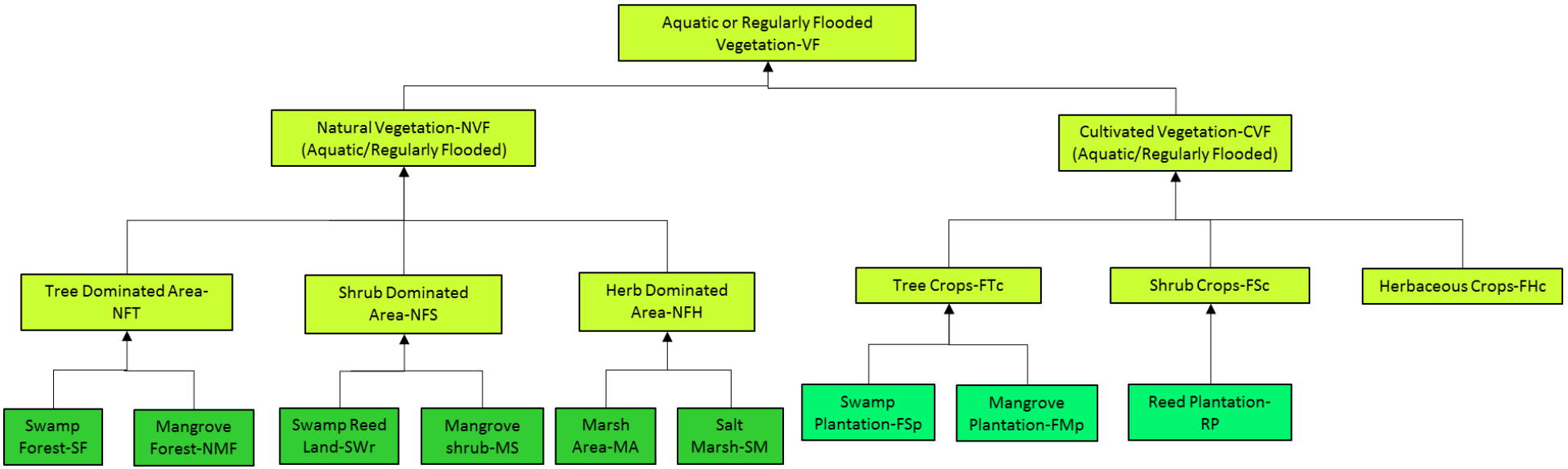

Figure 8: Schematic overview of the aquatic or regularly flooded vegetation land classes of the National land representation system of Bangladesh.

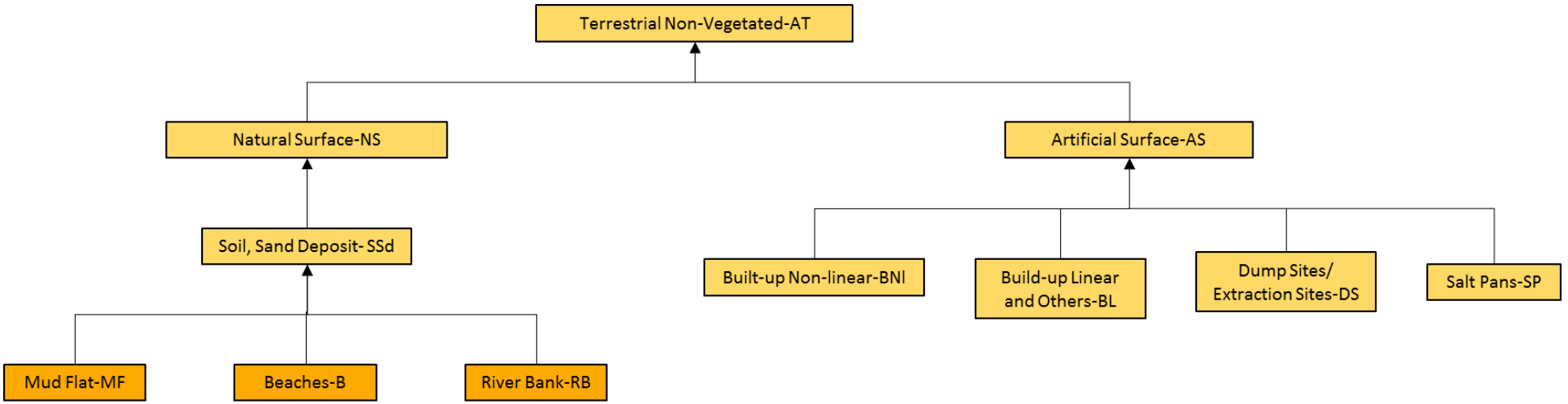

Figure 9: Schematic overview of the terrestrial non vegetated land classes of the National land representation system of Bangladesh.

Appendix B: Activities carried out by the Bangladesh Forest Department.

Table 18. Country-specific forestry activities conducted in the 5 zones of Bangladesh.

BFI zones	Activities undertaken by the BFD	Definition	Description	Availability of spatial data	Reference
Sal	Social Forestry	Social Forestry is a type of forestry practice in which local peoples are involved in forest management inside and outside the government forest land through legal agreement with benefit sharing mechanism.	• Social forestry is implemented in the degraded and encroached forest lands • Local peoples are involved in seedling raising, plantation raising and maintenance, regeneration management of natural forests and Silvicultural operations. Participants are also involved in protection of the plantations. • Poor, Landless, distressed, widows are selected as participants from nearby areas. • It encompasses short rotation, medium rotation and long rotation plantation. Sal coppice is also managed under this program. • Tree Farming Funds (TFF)are utilized for reforestation • Shares are distributed among the stakeholders according to the share distribution mechanism.	No	(MoLJPA 1927) The Forest Act 1927, Section 28A; Social Forestry rules 2004

BFI zones	Activities undertaken by the BFD	Definition	Description	Availability of spatial data	Reference
	Conservation	Forest Conservation is the practice of planning and maintaining forested areas for the benefit and sustainability of future generations. Forest Conservation involves the upkeep of the natural resources within a forest that are beneficial to both humans and the ecosystems. Conservation of forest in the Sal zone of Bangladesh is done by declaring the forests as reserved, protected, acquired and vested, Forest based on the Forest Act 1927 and other Acts and Ordinance.	• Conservation is done for the protection and development of flora and fauna of a particular area. • Forest lands are mainly declared as protected areas for biodiversity conservation and enhancement of carbon stock. These areas are managed by the forest department and co-management committee (CMC).	No	The Forest Act, 1927. The Wildlife (Conservation and Security) Act, 2012.
	Assisted Natural Regeneration	Assisted Natural Regeneration is the restoration of degraded forest through natural seedling and coppicing of native species.	• It is the low-cost management method for accelerating sal forest regeneration to restore degraded sal forest.	No	(BFD 2016)
Coastal	Coastal Afforestation/ Reforestation	Coastal afforestation is the plantation raised in the newly accreted land along the shore of Bay of Bengal.	• Coastal afforestation is done in the newly accreted char lands along the shore and also in roadsides, embankment, dykes to create a green belt to protect the local people from natural disaster and stabilize	Yes	The Forest Act, 1927.The Wildlife (Conservation and Security) Act, 2012.

BFI zones	Activities undertaken by the BFD	Definition	Description	Availability of spatial data	Reference
			the land. • *Sonneratia apetala* and *Avicenia officinalis* are the two major species used for coastal afforestation. • Coastal afforestation area is distributed along the coasts.		
	Conservation	Conservation of forest in the coastal zone of Bangladesh is done by declaring Reserved forests and protected areas. According to the Forest Act 1927, conservation in these types of forest defined as "Everything in this forests is permitted except anything prohibited to do"	• Forest lands are declared as protected areas for biodiversity conservation and enhancement of carbon stock. Tourism, NTFP harvesting (fishery, golpata, crab) are the activities in these areas.	No	
	Enrichment plantation	Enrichment plantation is a management technique for the improvement of mono culture forest stands through planting with native and suitable and ant tree species.	• Under this management, the native succession species (e.g. gewa, sundri etc.) are planted in the previously afforested areas. This technique has started in the coastal afforestation areas for the improvement of the structure and quality of the forest stand.	No	
	Social forestry	As defined earlier.	• The main activity in coastal zone is to plant in the roadsides and embankments with the mangrove and non-mangrove species involving the participants.	Yes	
Hill	Social forestry	As defined earlier.	• Plantation of the long rotation species in Hill forest is another activity of social	No	

BFI zones	Activities undertaken by the BFD	Definition	Description	Availability of spatial data	Reference
			forestry. As described earlier.		
	Enrichment plantation	Enrichment plantation is a technique for the improvement of degraded forest areas through planting with native and commercially important tree species.	• Degraded forest areas of the hill zone are planted by the forest department with the native and commercially important tree species.	No	
	Assisted Natural Regeneration	Assisted Natural Regeneration is the restoration of degraded forest through natural seeding and coppicing of native species.	• This is the regeneration management activity in the hill zone for restoration of the degraded hill forests	No	
	Conservation	Conservation of forest in the Hill zone of Bangladesh is done by declaring the forests as reserved and protected forest and protected areas based on the Forest Act 1927 and other Acts and Regulations. According to the Forest Act 1927, conservation in these types of forest defined as: (i) reserved forests- "everything is strictly prohibited unless or otherwise permitted"; and (ii) protected forests-	• Conservation of biodiversity, and protection of the forest from illegal harvesting is done by involving the local people through patrolling.	No	The Forest Act 1927;The Assam Forest Regulation,1891;The Wildlife(Protection and Security)Act, 2012

BFI zones	Activities undertaken by the BFD	Definition	Description	Availability of spatial data	Reference
		"Everything in this forests is permitted except anything prohibited to do."			
	Watershed management	This is a management practice to protect the watershed area by conserving the forest and without hampering the water flow	• In some places of the hill zone, part of the reserved forest (e.g. Kassalong reserve) is conserved for watershed management. • Water flows are not allowed to hamper in the watershed areas.	No	
	Development of NTFP plantation	This is defined as encouraging plantations of bamboo, cane, murta, medicinal plants usually found in the wild through subsidies and technical support, and later on promotion of handicrafts made from bamboo, Murta etc.	• This activity involves planting bamboo, murta, cane and other medicinal plants with the other plantations.	No	
	Livelihood support to forest dependent communities	This is defined as assessing the forest dependent communities livelihood needs through participatory appraisal, and involving other stakeholders to link identified needs and	• Livelihood support training provided to the forest depended communities like value added handcrafts production from forest products like cane, bamboo murta etc.	No	(BFD 2016)

BFI zones	Activities undertaken by the BFD	Definition	Description	Availability of spatial data	Reference
		government's livelihoods programmes.			
	promotion of fuel wood saving devices and technologies	Promotion of fuel wood saving devices and technology defined as adoption of improved cook stoves, solar cookers, biogas to the forest dependent communities through subsidies and networking with government agencies and other stakeholders promoting renewable energy.	----	No	(BFD 2016)
Sundarban	Conservation	Conservation of forest in the Sundarban zone of Bangladesh is done by declaring the forests as reserved Forests and Protected areas based on the Forest Act 1927 and The Wildlife (Conservation and Security) Act, 2012. According to the Forest Act 1927, conservation in this type of forest defined as "everything is strictly prohibited unless or otherwise permitted".	Biodiversity conservation, enhancement of carbon stock and co-tourism	Yes	The Forest Act, 1927.The Wildlife(Conservation and Security) Act,2012
Village	Social forestry	As defined earlier	• Strip (Roadside, Embankment ,Railway	No	

BFI zones	Activities undertaken by the BFD	Definition	Description	Availability of spatial data	Reference
			Lines Plantation) • plantation, institutional planting nursery raising, seedling distribution • Country wide annual Tree Fair and Tree Plantation campaign • Forestry extension activity; • Publication and distribution of forestry extension material		
	Homestead plantation	Trees and other plants grown around the homestead.	• Villagers plant the seedlings around their homestead. They collect the seedlings from local markets and Forest Department (FD) nurseries. FD officials provide technical support.		
	Institutional plantation	Plantations raised in and around the institutions like educational/religious/cultural and different office premises.	• Forest department provides technical support and supply the seedlings free of cost.		

Appendix C: Detailed land use changes matrices, emissions and removal factors and emission and removals per zone and at national level

Table 19: Adjusted areas (in hectares) of **deforestation, reforestation and stable non-forest** at the **National** level.

Area adj (ha)		2015														
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
2000	**1**							248	21	3,292	0	104	622	933		117,095
	2								134	1	189	57	2,523	0		
	3							1	33	5,465	967	891	3,397	1,775		0
	4							86	56	1,013		4	1	53		85
	5							3		132		8	1	57		326
	6											2	0		141	
	7	111			33	1		89,952	1	2,035	12	49	216	621		
	8	26	831	1,921		0	53	19	26,018	11,390	4,251	1,089	9,530	836	4	
	9	1,040	27	401	14	156	86	83,308	7,976	6,869,494	7,839	340,274	156,150	94,757	51	1,111
	10	15	578	2,548				11	623	7,191	11,362	4,186	30,199	365		
	11	521	69	100	3	2		1,156	10,564	151,771	1,135	430,516	80,385	13,295	50	1,330
	12	31	1,372	4,784	0	0	1	207	19,472	84,317	48,513	41,302	942,587	5,638	32	161
	13	151	1	11	0	1		1,448	96	10,328	526	62,335	16,931	2,993,052		512
	14							0	3	1,051		10	256	4	12,972	
	15	99,411		0	0	5,940		3,660	60	3,990	3	743	1,375	6,441		452,623

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 20: Adjusted emission and removal factors (in tCO_2e/ha) associated with the adjusted areas (in ha) of **deforestation, reforestation and stable non-forest** at the **National** level.

EFRF adj (tCO2e/ha)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1							-31	-36	80	138	101	121	18		88
	2								-410	14	107	112	101	7		
	3							5	-61	54	36	54	54	54		-
	4							48	-131	113		71	116	65		115
	5							-140		41		56	48	-31		55
	6											-	-		-	
	7	194			91	161		-9	-	58	-	153	33	52		
	8	-2	126	-57		-	65	-4	-7	1	5	3	10	-22	-	
	9	-50	-14	-25	-39	-31	-	-33	-7	-	-	-	-	-14	-	-7
	10	-1	-127	-70				-4	-4	-	-	-	-	-4		
	11	-43	-90	-13	-85	-73		-36	-0	-	-	-	-	-8	-	-6
	12	-46	-83	-69	-	-	-	-14	-6	-	-	-	-	-11	-	-6
	13	4	-11	1	31	22		-64	-45	14	35	38	47	-2		24
	14							-330	-	-		-	-	-	-	
	15	-50		-	-48	-40		-98	-39	13	32	14	15	-28		3

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 21: Annual emissions and removals (in tCO_2e/year) from **deforestation, reforestation and stable non-forest** at the **National** level.

ER (tCO_2e/year)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1							-521	-51	17,542	2	704	5,038	1,089		686,086
	2								-3,672	1	1,343	424	16,982	0		
	3							0	-136	19,705	2,311	3,219	12,265	6,373		-
	4							274	-485	7,606		18	4	229		653
	5							-24		361		29	3	-118		1,193
	6											-	-		-	
	7	1,440			197	13		-55,410	-	7,862	-	501	474	2,171		
	8	-3	6,998	-7,251		-	228	-5	-12,008	997	1,319	253	6,143	-1,248	-	
	9	-3,463	-25	-662	-37	-324	-	-181,440	-3,554	-	-	-	-	-89,375	-	-513
	10	-1	-4,886	-11,897				-3	-166	-	-	-	-	-103		
	11	-1,488	-415	-88	-17	-8		-2,774	-315	-	-	-	-	-7,045	-	-561
	12	-95	-7,564	-21,957	-	-	-	-196	-7,659	-	-	-	-	-4,238	-	-61
	13	42	-1	1	1	1		-6,197	-284	9,360	1,232	156,967	52,982	-408,452		804
	14							-7	-	-		-	-	-	-	
	15	-332,675		-	-0	-15,837		-23,919	-157	3,389	6	715	1,361	-12,105		81,020

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 22: Adjusted areas (in hectares) of **high degradation** at the **National** level.

Area adj (ha)		2015														
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
2000	**1**	37,900			502	228										
	2		5													
	3			734												
	4	1,035			5,914											
	5	74				217										
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 23: Adjusted emission factors (in tCO_2e/ha) associated with the adjusted areas (in ha) of **high degradation** at the **National** level.

EFRF (tCO_2e/ha)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1	66			90	95										
	2		66													
	3			39												
	4	118			91											
	5	48				45										
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 24: Annual emissions (in tCO_2e/year) from **high degradation** at the **National** level.

ER (tCO_2e/year)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1	165,846			3,003	1,444										
	2		23													
	3			1,920												
	4	8,136			35,951											
	5	237				649										
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 25: Adjusted areas (in hectares) of **low degradation** at the **National** level.

Area adj (ha)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1	104,183			94	13										
	2		199													
	3			2,459												
	4	214			3,866	15										
	5	86				1,885										
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 26: Adjusted emission and removal factors (in tCO_2e/ha) associated with the adjusted areas (in ha) of **low degradation** at the **National** level.

EFRF (tCO_2e/ha)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1	16			3	34										
	2		16													
	3			19												
	4	53			28	77										
	5	-9				16										
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 27: Annual emissions and removals (in tCO_2e/year) from **low degradation** at the **National** level.

ER (tCO_2e/year)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1	113,803			18	29										
	2		218													
	3			3,068												
	4	757			7,314	77										
	5	-52				1,973										
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 28: Adjusted areas (in hectares) of **high restoration** at the **National** level.

Area adj (ha)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1	16,826			20	206										
	2		1,441													
	3			56,354												
	4	1,799			1,405											
	5	76				2,179										
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 29: Adjusted removal factors (in tCO_2e/ha) associated with the adjusted areas (in ha) of **high restoration** at the **National** level.

EFRF (tCO_2e/ha)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1	-63			-125	-74										
	2		-166													
	3			-63												
	4	-58			-65											
	5	-96				-49										
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 30: Annual removals (in tCO_2e/year) from **high restoration** at the **National** level.

ER (tCO_2e/year)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1	-70,707			-165	-1,024										
	2		-15,942													
	3			-236,998												
	4	-6,980			-6,105											
	5	-487				-7,123										
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 31: Adjusted areas (in hectares) of **low restoration** at the **National** level.

Area adj (ha)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1	20,864			2	62										
	2		4,991													
	3			41,884												
	4	360			2,539	54										
	5	277				3,924										
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 32: Adjusted emission and removal factors (in tCO_2e/ha) associated with the adjusted areas (in ha) of **low restoration** at the **National** level.

EFRF (tCO_2e/ha)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1	-16			-33	-15										
	2		-19													
	3			-16												
	4	2			-26	-3										
	5	-36				-13										
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 33: Annual emissions and removals (in tCO_2e/year) from **low restoration** at the **National** level.

ER (tCO_2e/year)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1	-22,157			-4	-63										
	2		-6,164													
	3			-45,107												
	4	37			-4,462	-10										
	5	-663				-3,512										
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 34: Adjusted areas (in hectares) of **deforestation, reforestation and stable non-forest** in the **coastal** zone.

Area adj (ha)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1									2				0		3
	2										11		86	0		
	3							1	32	5,346	957	847	3,387	1,768		0
	4															
	5															
	6															
	7							46		185	12		158	113		
	8			1,909				7	618	7,529	3,663	726	5,720	684		
	9	79	3	312				180	1,057	191,268	3,957	7,055	27,347	10,172		3
	10	13		2,461				10	418	5,729	10,368	3,034	24,439	214		
	11	112		96				3		541	600	21,781	1,690	325		1
	12	3	0	4,750				1	2,853	10,615	40,032	1,174	406,277	294		
	13	13		11				11	3	1,125	314	609	4,878	102,409		101
	14															
	15	489		0						179		0	0	1		3,924

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 35: Adjusted emission and removal factors (in tCO_2e/ha) associated with the adjusted areas (in ha) of **deforestation, reforestation and stable non-forest** in the **coastal** zone.

EFRF (tCO_2e/ha)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1									52				-36		40
	2										202		149	26		
	3							5	-63	55	36	56	54	54		-
	4															
	5															
	6															
	7							-13		33	-		11	-1		
	8			-57				-98	-255	2	4	3	14	-27		
	9	-63	-45	-27				-23	-2	-	-	-	-	-20		-5
	10	-		-72				-4	-6	-	-	-	-	-1		
	11	-18		-14				-7		-	-	-	-	-6		-
	12	-	-145	-69				-55	-26	-	-	-	-	-14		
	13	3		1				-11	-143	12	30	25	37	-10		21
	14															
	15	-42		-						5		-	-	-		-1

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 36: Annual emissions and removals (in tCO_2e/year) from **deforestation, reforestation and stable non-forest** in the **coastal** zone.

ER (tCO_2e/year)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1									6				-1		9
	2										147		861	0		
	3							0	-133	19,699	2,310	3,183	12,263	6,373		-
	4															
	5															
	6															
	7							-39		403	-		115	-10		
	8			-7,251				-49	-10,509	897	901	126	5,416	-1,223		
	9	-330	-8	-568				-281	-128	-	-	-	-	-13,277		-1
	10	-		-11,777				-3	-154	-	-	-	-	-18		
	11	-131		-87				-1		-	-	-	-	-122		-
	12	-	-2	-21,851				-2	-4,966	-	-	-	-	-279		
	13	2		1				-8	-25	897	633	1,028	12,040	-71,372		140
	14															
	15	-1,359		-						55		-	-	-		-136

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 37: Adjusted areas (in hectares) of **high degradation** in the **coastal** zone.

Area adj (ha)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1															
	2															
	3			734												
	4															
	5															
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 38: Adjusted emission factors (in tCO_2e/ha) associated with the adjusted areas (in ha) of **high degradation** in the **coastal** zone.

EFRF (tCO_2e/ha)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1															
	2															
	3			39												
	4															
	5															
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 39: Annual emissions (in tCO_2e/year) from **high degradation** in the **coastal** zone.

ER (tCO_2e/year)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1															
	2															
	3			1,920												
	4															
	5															
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 40: Adjusted areas (in hectares) of **low degradation** in the **coastal** zone.

Area adj (ha)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1	9														
	2															
	3			2,341												
	4															
	5															
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 41: Adjusted emission factors (in tCO_2e/ha) associated with the adjusted areas (in ha) of **low degradation** in the **coastal** zone.

EFRF (tCO_2e/ha)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1	22														
	2															
	3			19												
	4															
	5															
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 42: Annual emissions (in tCO_2e/year) from **low degradation** in the **coastal** zone.

ER (tCO_2e/year)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1	14														
	2															
	3			2,937												
	4															
	5															
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 43: Adjusted areas (in hectares) of **high restoration** in the **coastal** zone.

Area adj (ha)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1	0														
	2															
	3			55,037												
	4															
	5															
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 44: Adjusted removal factors (in tCO_2e/ha) associated with the adjusted areas (in ha) of **high restoration** in the **coastal** zone.

EFRF (tCO_2e/ha)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1	-145														
	2															
	3			-63												
	4															
	5															
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 45: Annual removals (in tCO_2e/year) from **high restoration** in the **coastal** zone.

ER (tCO_2e/year)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1	-4														
	2															
	3			-231,000												
	4															
	5															
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 46: Adjusted areas (in hectares) of **low restoration** in the **coastal** zone.

Area adj (ha)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1	91														
	2															
	3			41,644												
	4															
	5															
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 47: Adjusted removal factors (in tCO_2e/ha) associated with the adjusted areas (in ha) of **low restoration** in the **coastal** zone.

EFRF (tCO_2e/ha)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1	-21														
	2															
	3			-16												
	4															
	5															
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 48: Annual removals (in tCO_2e/year) from **low restoration** in the **coastal** zone.

ER (tCO_2e/year)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1	-128														
	2															
	3			-44,851												
	4															
	5															
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 49: Adjusted areas (in hectares) of **deforestation, reforestation and stable non-forest** in the **hill** zone.

Area adj (ha)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1							151		2,401	0	91	618	808		116,545
	2															
	3															
	4															1
	5							2		91		5	1	53		314
	6															
	7							36		0						
	8									3		1				
	9	588				105		487		114,043	4	1,775	1,211	2,224		904
	10															
	11	301				1		2		4,170		46,808	370	648		1,257
	12	21				0		3		441	2	13	6,340	68		122
	13	122				1		1		228	0	1,388	75	72,405		380
	14															
	15	90,373			0	5,213		3,654		3,009	3	632	1,319	6,169		427,394

1: Forest Tree Dominated Area (Terrestrial), 2: Mangrove Forest, 3: Mangrove Plantation, 4: Plain Land Forest (Sal Forest), 5: Rubber Plantation, 6: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, 7: Orchards and Other Plantations (Trees), 8: Herb Dominated Area, 9: Herbaceous Crops, 10: Mud Flats or Intertidal Area, 11: Non vegetated, 12: Rivers and Khals, 13: Rural Settlement, 14: Swamp Reed Land, 15: Shrubs with scattered trees

Table 50: Adjusted emission and removal factors (in tCO_2e/ha) associated with the adjusted areas (in ha) of **deforestation, reforestation and stable non-forest** in the **hill** zone.

EFRF (tCO_2e/ha)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1							-50		77	138	103	122	19		88
	2															
	3															
	4															104
	5							-142		49		50	75	-32		56
	6															
	7							-26		-						
	8									-		-				
	9	-57				-30		-144		-	-	-	-	-29		-7
	10															
	11	-56				-86		-181		-		-	-	-27		-7
	12	-60				-		-6		-	-	-	-	-14		-6
	13	4				23		-8		21	-	29	26	-5		24
	14															
	15	-51			-	-39		-98		15	32	16	15	-28		3

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 51: Annual emissions and removals (in tCO_2e/year) from **deforestation, reforestation and stable non-forest** in the **hill** zone.

ER (tCO_2e/year)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1							-501		12,307	2	622	5,023	1,007		683,407
	2															
	3															
	4															5
	5							-20		295		17	3	-111		1,164
	6															
	7							-61		-						
	8									-		-				
	9	-2,224				-211		-4,673		-	-	-	-	-4,359		-449
	10															
	11	-1,126				-8		-21		-		-	-	-1,154		-546
	12	-83				-		-1		-	-	-	-	-62		-52
	13	29				1		-1		311	-	2,646	131	-23,227		620
	14															
	15	-305,635			-	-13,483		-23,864		2,979	6	669	1,344	-11,640		79,495

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 52: Adjusted areas (in hectares) of **high degradation** in the **hill** zone.

Area adj (ha)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1	29,280				220										
	2															
	3															
	4															
	5	70				217										
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 53: Adjusted emission factors (in tCO_2e/ha) associated with the adjusted areas (in ha) of **high degradation** in the **hill** zone.

EFRF (tCO_2e/ha)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1	63				96										
	2															
	3															
	4															
	5	47				45										
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 54: Annual emissions (in tCO_2e/year) from **high degradation** in the **hill** zone.

ER (tCO_2e/year)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1	122,009				1,401										
	2															
	3															
	4															
	5	219				649										
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 55: Adjusted areas (in hectares) of **low degradation** in the **hill** zone.

Area adj (ha)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1	100,891				12										
	2															
	3															
	4				10											
	5	86				990										
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 56: Adjusted emission and removal factors (in tCO_2e/ha) associated with the adjusted areas (in ha) of **low degradation** in the **hill** zone.

EFRF (tCO_2e/ha)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1	16				35										
	2															
	3															
	4				17											
	5	-9				13										
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 57: Annual emissions and removals (in tCO_2e/year) from **low degradation** in the **hill** zone.

ER (tCO_2e/year)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1	109,332				28										
	2															
	3															
	4				11											
	5	-52				890										
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 58: Adjusted areas (in hectares) of **high restoration** in the **hill** zone.

Area adj (ha)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1	11,150				173										
	2															
	3															
	4															
	5	63				2,112										
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 59: Adjusted removal factors (in tCO_2e/ha) associated with the adjusted areas (in ha) of **high restoration** in the **hill** zone.

EFRF (tCO_2e/ha)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1	-66				-84										
	2															
	3															
	4															
	5	-100				-49										
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 60: Annual removals (in tCO_2e/year) from **high restoration** in the **hill** zone.

ER (tCO_2e/year)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1	-48,851				-969										
	2															
	3															
	4															
	5	-421				-6,953										
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 61: Adjusted areas (in hectares) of **low restoration** in the **hill** zone.

Area adj (ha)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1	16,972				9										
	2															
	3															
	4	23			517											
	5	277				2,502										
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 62: Adjusted emission and removal factors (in tCO_2e/ha) associated with the adjusted areas (in ha) of **low restoration** in the **hill** zone.

EFRF (tCO_2e/ha)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1	-16				-16										
	2															
	3															
	4	6			-36											
	5	-36				-11										
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 63: Annual emissions and removals (in tCO_2e/year) from **low restoration** in the **hill** zone.

ER (tCO_2e/year)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1	-18,002				-10										
	2															
	3															
	4	9			-1,240											
	5	-663				-1,860										
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 64: Adjusted areas (in hectares) of **deforestation, reforestation and stable non-forest** in the **sal** zone.

Area adj (ha)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1							83	20	583		7	0	79		57
	2															
	3															
	4							81	56	976		3	0	52		74
	5							0		22				0		0
	6															
	7	1			1	0		26,245	0	1,028		2	0	440		
	8	0						4	1,083	0		0				
	9	28			11	6		2,552	137	15,484		15,580	1,700	3,336		5
	10															
	11	1			3			4	0	1,332		42,938	163	210		0
	12	0						3		62		99	4,679	39		0
	13	4			0	0		49	1	275		0,754	137	154,653		
	14															
	15	3,236			0	577		1	0	11		0	0	56		2,562

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 65: Adjusted emission and removal factors (in tCO_2e/ha) associated with the adjusted areas (in ha) of **deforestation, reforestation and stable non-forest** in the **sal** zone.

EFRF (tCO_2e/ha)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1							-15	-10	107		106	21	15		118
	2															
	3															
	4							49	-131	114		61	132	65		117
	5							-132		37				-28		69
	6															
	7	159			54	217		2	-	77		128	-	67		
	8	-						181	11	-		-				
	9	-33			-45	-26		-87	-274	-		-	-	-41		-7
	10															
	11	-77			-87			-109	-	-		-	-	-23		-
	12	-						-42		-		-	-	-6		-
	13	30			42	-		-99	-44	65		35	29	1		
	14															
	15	-39			-49	-52		-20	-	9		-	-	-51		13

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 66: Annual emissions and removals (in tCO_2e/year) from **deforestation, reforestation and stable non-forest** in the **sal** zone.

ER (tCO_2e/year)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1							-82	-13	4,161		48	0	80		448
	2															
	3															
	4							263	-485	7,400		13	3	229		580
	5							-4		53				-1		2
	6															
	7	11			3	1		3,113	-	5,247		15	-	1,977		
	8	-						51	768	-		-				
	9	-61			-32	-10		-14,818	-2,510	-		-	-	-9,090		-2
	10															
	11	-5			-17			-32	-	-		-	-	-326		-
	12	-						-9		-		-	-	-15		-
	13	8			1	-		-320	-2	1,190		25,084	265	11,156		
	14															
	15	-8,467			-0	-2,016		-1	-	6		-	-	-189		2,136

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 67: Adjusted areas (in hectares) of **high degradation** in the **sal** zone.

Area adj (ha)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1	7,603			484	3										
	2															
	3															
	4	959			5,857											
	5	0														
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 68: Adjusted emission factors (in tCO_2e/ha) associated with the adjusted areas (in ha) of **high degradation** in the **sal** zone.

EFRF (tCO_2e/ha)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1	74			90	89										
	2															
	3															
	4	118			91											
	5	113														
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 69: Annual emissions (in tCO_2e/year) from **high degradation** in the **sal** zone.

ER (tCO_2e/year)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1	37,574			2,909	16										
	2															
	3															
	4	7,525			35,682											
	5	3														
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 70: Adjusted areas (in hectares) of **low degradation** in the **sal** zone.

Area adj (ha)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1	2,883			83	1										
	2															
	3															
	4	185			3,671	15										
	5					888										
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 71: Adjusted emission factors (in tCO_2e/ha) associated with the adjusted areas (in ha) of **low degradation** in the **sal** zone.

EFRF (tCO_2e/ha)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1	21			1	21										
	2															
	3															
	4	57			29	77										
	5					18										
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 72: Annual emissions (in tCO_2e/year) from **low degradation** in the **sal** zone.

ER (tCO_2e/year)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1	4,020			7	1										
	2															
	3															
	4	699			7,002	77										
	5					1,076										
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 73: Adjusted areas (in hectares) of **high restoration** in the **sal** zone.

Area adj (ha)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1	4,395			5	1										
	2															
	3															
	4	1,772			1,405											
	5	5				66										
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 74: Adjusted removal factors (in tCO_2e/ha) associated with the adjusted areas (in ha) of **high restoration** in the **sal** zone.

EFRF (tCO_2e/ha)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1	-53			-184	-56										
	2															
	3															
	4	-58			-65											
	5	-69				-38										
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 75: Annual removals (in tCO_2e/year) from **high restoration** in the **sal** zone.

ER (tCO_2e/year)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1	-15,665			-56	-3										
	2															
	3															
	4	-6,898			-6,105											
	5	-25				-170										
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 76: Adjusted areas (in hectares) of **low restoration** in the **sal** zone.

Area adj (ha)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1	2,443			2	3										
	2															
	3															
	4	261			1,591	54										
	5					1,385										
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 77: Adjusted removal factors (in tCO_2e/ha) associated with the adjusted areas (in ha) of **low restoration** in the **sal** zone.

EFRF (tCO_2e/ha)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1	-17			-33	-19										
	2															
	3															
	4	0			-24	-3										
	5					-18										
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 78: Annual emissions and removals (in tCO_2e/year) from **low restoratio**n in the **sal** zone.

ER (tCO_2e/year)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1	-2,806			-4	-3										
	2															
	3															
	4	7			-2,560	-10										
	5					-1,616										
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 79: Adjusted areas (in hectares) of **deforestation, reforestation and stable non-forest** in the **sundarban** zone.

Area adj (ha)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1															
	2								134	0	173	55	2,434			
	3												2			
	4															
	5															
	6															
	7															
	8		831						469		200	32	585			
	9		4						0			0	0			
	10		573						30		362	104	4,421			
	11		68						39		122	214	765			
	12		1,346					0	164	0	672	239	216,757			
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 80: Adjusted emission and removal factors (in tCO_2e/ha) associated with the adjusted areas (in ha) of **deforestation, reforestation and stable non-forest** in the **sundarban** zone.

EFRF (tCO_2e/ha)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1															
	2								-411	-	102	114	99			
	3												-			
	4															
	5															
	6															
	7															
	8		126						-58		29	52	12			
	9		-7						-46			-	-			
	10		-127						-		-	-	-			
	11		-91					-	-62		-	-	-			
	12		-83					-	-205	-	-	-	-			
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 81: Annual emission and removals (in tCO_2e/year) from **deforestation, reforestation and stable non-forest** in the **sundarban** zone.

ER (tCO_2e/year)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1															
	2								-3,669	-	1,180	417	16,115			
	3												-			
	4															
	5															
	6															
	7															
	8		6,998						-1,830		391	108	474			
	9		-2						-0			-	-			
	10		-4,849						-		-	-	-			
	11		-414						-163		-	-	-			
	12		-7,473					-	-2,238	-	-	-	-			
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 82: Adjusted areas (in hectares) of **high degradation** in the **sundarban** zone.

Area adj (ha)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1															
	2		5													
	3															
	4															
	5															
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 83: Adjusted emission factors (in tCO_2e/ha) associated with the adjusted areas (in ha) of **high degradation** in the **sundarban** zone.

EFRF (tCO_2e/ha)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1															
	2		66													
	3															
	4															
	5															
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 84: Annual emissions (in tCO_2e/year) from **high degradation** in the **sundarban** zone.

ER (tCO_2e/year)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1															
	2		23													
	3															
	4															
	5															
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), 2: Mangrove Forest, 3: Mangrove Plantation, 4: Plain Land Forest (Sal Forest), 5: Rubber Plantation, 6: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, 7: Orchards and Other Plantations (Trees), 8: Herb Dominated Area, 9: Herbaceous Crops, 10: Mud Flats or Intertidal Area, 11: Non vegetated, 12: Rivers and Khals, 13: Rural Settlement, 14: Swamp Reed Land, 15: Shrubs with scattered trees

Table 85: Adjusted areas (in hectares) of **low degradation** in the **sundarban** zone.

Area adj (ha)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1															
	2		199													
	3															
	4															
	5															
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 86: Adjusted emission factors (in tCO_2e/ha) associated with the adjusted areas (in ha) of **low degradation** in the **sundarban** zone.

EFRF (tCO_2e/ha)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1															
	2		16													
	3															
	4															
	5															
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 87: Annual emissions (in tCO_2e/year) from **low degradation** in the **sundarban** zone.

ER (tCO_2e/year)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1															
	2		218													
	3			-												
	4															
	5															
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), 2: Mangrove Forest, 3: Mangrove Plantation, 4: Plain Land Forest (Sal Forest), 5: Rubber Plantation, 6: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, 7: Orchards and Other Plantations (Trees), 8: Herb Dominated Area, 9: Herbaceous Crops, 10: Mud Flats or Intertidal Area, 11: Non vegetated, 12: Rivers and Khals, 13: Rural Settlement, 14: Swamp Reed Land, 15: Shrubs with scattered trees

Table 88: Adjusted areas (in hectares) of **high restoration** in the **sundarban** zone.

Area adj (ha)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1															
	2		1,441													
	3															
	4															
	5															
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 89: Adjusted removal factors (in tCO_2e/ha) associated with the adjusted areas (in ha) of **high restoration** in the **sundarban** zone.

EFRF (tCO_2e/ha)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1															
	2		-166													
	3															
	4															
	5															
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 90: Annual removals (in tCO_2e/year) from **high restoration** in the **sundarban** zone.

ER (tCO_2e/year)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1															
	2		-15,942													
	3															
	4															
	5															
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 91: Adjusted areas (in hectares) of **low restoration** in the **sundarban** zone.

Area adj (ha)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1															
	2		4,991													
	3															
	4															
	5															
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 92: Adjusted removal factors (in tCO_2e/ha) associated with the adjusted areas (in ha) of **low restoration** in the **sundarban** zone.

EFRF (tCO_2e/ha)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1															
	2		-19													
	3															
	4															
	5															
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 93: Annual removals (in tCO_2e/year) from **low restoration** in the **sundarban** zone.

ER (tCO_2e/year)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1															
	2		-6,164													
	3															
	4															
	5															
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 94: Adjusted areas (in hectares) of **deforestation, reforestation and stable non-forest** in the **village** zone.

Area adj (ha)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1							14	1	307		7	4	45		490
	2								0	1	5	1	2	0		
	3							0	1	118	11	44	8	6		
	4							5		37		1	0	1		10
	5							0		19		3	0	4		12
	6											2	0		141	
	7	110			32	1		63,624	0	822		47	58	68		
	8	26		12		0	53	7	23,848	3,857	389	331	3,225	152	4	
	9	346	20	89	3	45	86	80,090	6,782	6,348,699	3,877	315,864	125,891	79,025	51	199
	10	2	5	86				1	175	1,462	632	1,048	1,339	150		
	11	107	1	4	0	0		1,147	10,524	145,728	413	318,776	77,397	12,112	50	72
	12	7	25	34	0		1	201	16,454	73,199	7,807	39,777	308,535	5,237	32	38
	13	13	1	0	0	0		1,388	93	8,700	212	49,584	11,840	2,663,585		31
	14							0	3	1,051		10	256	4	12,972	
	15	5,314				151		5	60	792		110	56	216		18,743

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 95: Adjusted emission and removal factors (in tCO_2e/ha) associated with the adjusted areas (in ha) of **deforestation, reforestation and stable non-forest** in the **village** zone.

EFRF (tCO_2e/ha)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1							67	-538	52		77	57	1		68
	2								-81	14	45	73	53	-		
	3							-	-29	1	2	12	4	-1		
	4							33		84		104	93	9		101
	5							-129		10		68	-	-23		34
	6											-	-		-	
	7	194			92	158		-14	-	40		154	92	45		
	8	-2		-		-	65	-14	-0	0	1	1	1	-2	-	
	9	-37	-11	-16	-23	-34	-	-30	-2	-	-	-	-	-12	-	-5
	10	-9	-115	-21				-	-1	-	-	-	-	-9		
	11	-32	-9	-2	-19	-22		-36	-0	-	-	-	-	-7	-	-3
	12	-26	-53	-47	-		-	-14	-0	-	-	-	-	-11	-	-3
	13	2	-11	-	-3	-		-63	-42	12	42	39	51	-2		21
	14							-330	-	-		-	-	-	-	
	15	-49				-34		-168	-39	7		6	5	-19		-0

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 96: Annual emissions and removals (in tCO_2e/year) from **deforestation, reforestation and stable non-forest** in the **village** zone.

ER (tCO_2e/year)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1							63	-38	1,067		34	15	2		2,221
	2								-2	1	16	7	6	-		
	3							-	-3	6	1	35	2	-0		
	4							11		206		6	1	1		68
	5							-0		13		12	-	-6		27
	6											-	-		-	
	7	1,429			194	12		-58,420	-	2,212		486	359	205		
	8	-3		-		-	228	-7	-436	100	28	19	254	-25	-	
	9	-848	-15	-94	-5	-103	-	-161,669	-916	-	-	-	-	-62,651	-	-62
	10	-1	-37	-121				-	-13	-	-	-	-	-86		
	11	-226	-1	-1	-0	-1		-2,720	-153	-	-	-	-	-5,442	-	-15
	12	-13	-89	-106	-		-	-183	-454	-	-	-	-	-3,883	-	-9
	13	1	-1	-	-0	-		-5,868	-258	6,960	599	128,211	40,545	-324,957		44
	14							-7	-	-		-	-	-	-	
	15	-17,213				-337		-54	-157	348		46	18	-275		-466

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 97: Adjusted areas (in hectares) of **high degradation** in the **village** zone.

Area adj (ha)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1	1,017			17	5										
	2															
	3															
	4	76			57											
	5	4														
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 98: Adjusted emission factors (in tCO_2e/ha) associated with the adjusted areas (in ha) of **high degradation** in the **village** zone.

EFRF (tCO_2e/ha)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1	92			81	76										
	2															
	3															
	4	121			71											
	5	62														
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 99: Annual emissions (in tCO_2e/year) from **high degradation** in the **village** zone.

ER (tCO_2e/year)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1	6,263			94	27										
	2															
	3															
	4	611			268											
	5	15														
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 100: Adjusted areas (in hectares) of **low degradation** in the **village** zone.

Area adj (ha)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1	400			11											
	2															
	3			118												
	4	29			185											
	5					7										
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 101: Adjusted emission factors (in tCO_2e/ha) associated with the adjusted areas (in ha) of **low degradation** in the **village** zone.

EFRF (tCO_2e/ha)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1	17			15											
	2															
	3			17												
	4	30			24											
	5					15										
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 102: Annual emissions (in tCO_2e/year) from **low degradation** in the **village** zone.

ER (tCO_2e/year)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1	442			11											
	2															
	3			132												
	4	58			301											
	5					7										
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 103: Adjusted areas (in hectares) of **high restoration** in the **village** zone.

Area adj (ha)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1	1,280			15	33										
	2															
	3			1,317												
	4	27														
	5	8														
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 104: Adjusted removal factors (in tCO_2e/ha) associated with the adjusted areas (in ha) of **high restoration** in the **village** zone.

EFRF (tCO_2e/ha)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1	-72			-108	-24										
	2															
	3			-68												
	4	-45														
	5	-79														
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 105: Annual removals (in tCO_2e/year) from **high restoration** in the **village** zone.

ER (tCO_2e/year)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1	-6,187			-109	-53										
	2															
	3			-5,996												
	4	-82														
	5	-41														
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

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Table 106: Adjusted areas (in hectares) of **low restoration** in the **village** zone.

Area adj (ha)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1	1,358				50										
	2															
	3			240												
	4	76			432											
	5					37										
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 107: Adjusted emission and removal factors (in tCO_2e/ha) associated with the adjusted areas (in ha) of **low restoration** in the **village** zone.

EFRF (tCO_2e/ha)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1	-13				-15										
	2															
	3			-16												
	4	4			-23											
	5					-14										
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees

Table 108: Annual emissions and removals (in tCO_2e/year) from **low restoration** in the **village** zone.

ER (tCO_2e/year)		2015														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2000	1	-1,221				-50										
	2															
	3			-255												
	4	21			-662											
	5					-36										
	6															
	7															
	8															
	9															
	10															
	11															
	12															
	13															
	14															
	15															

1: Forest Tree Dominated Area (Terrestrial), **2**: Mangrove Forest, **3**: Mangrove Plantation, **4**: Plain Land Forest (Sal Forest), **5**: Rubber Plantation, **6**: Forest Tree Dominated Area (Aquatic/ Regularly Flooded, **7**: Orchards and Other Plantations (Trees), **8**: Herb Dominated Area, **9**: Herbaceous Crops, **10**: Mud Flats or Intertidal Area, **11**: Non vegetated, **12**: Rivers and Khals, **13**: Rural Settlement, **14**: Swamp Reed Land, **15**: Shrubs with scattered trees