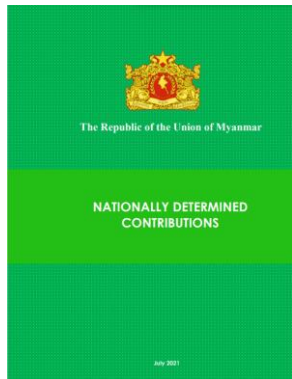


**The Republic of the Union of Myanmar
Ministry of Natural Resources and Environmental Conservation
Forest Department**



Assessing the vulnerability of Mangrove Ecosystem in Myanmar to Climate Change: Enhancing Myanmar Forestry Sector to meet 1.5-degree Paris Goal



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Abstract

Forests are scientifically acknowledged and valued as an incomparable remover of CO₂ one major GHGs from the atmosphere due to their photosynthesis system and carbon conversion process. Among them, mangrove forest plays key functions by having of unique ecosystems, natural shield to against natural disaster, and higher carbon sequestration than terrestrial forest. If both terrestrial and mangrove forests are not under the sustainable and systematic management, they release a huge amount of GHGs particularly CO₂ into the atmosphere based on its biomass content. Even though Myanmar had forest cover accounted for 57.97% of its land area until 1990, 387,527 ha of those forests were yearly lost during the period 2005-2015. This situation makes forestry sector weaken to remove GHGs from the atmosphere and less support climate change mitigation. 1.5°C Paris Agreement goal has been set up to strengthen the Cancun 2°C goal in consideration with the vulnerable countries about the adverse consequences of a 2°C warming level. The research method mainly include review on an outcome of research conducted in Myanmar coast and historical office documents, scientific research papers, and statistical analysis. Objectives of this study are to enhance climate change mitigation through Myanmar sustainable forest management system inclusive of adaptive capacity of mangrove ecosystem enhancement, to support Myanmar Nationally Determined Contributions – NDC update implementation, and to raise awareness on the national efforts to meet Myanmar's commitment to both United Nations Framework Convention on Climate Change and Paris Agreement. Total emission of 842.75 million tCO₂e during 2021-2030 was calculated for Energy, FOLU, Energy Efficiency, and other sectors. Unconditionally 25% of emission is to be reduced by 2030 but major threats; legal and illegal timber and forest product extraction, agricultural expansion on Virgin, Fallow and Vacant land, and transformation of forest land to agrobusiness farms and plantations (rubber, oil palm, betel nut, bananas, others) are likely to depress the success of Myanmar FOLU sector. Strengthening both institutional capacity, human resource capacity and willingness, collaboration between and among line ministries, encouraging policy level and public awareness and participation, enhancing law enforcement, and technical improvement and financial sufficiency to protect forests and their ecosystems particularly mangrove ecosystem are recommended.

Key words: Paris Agreement, deforestation, FOLU, GHG emission, NDC, mangrove

မြန်မာနိုင်ငံရှိဒီရေရောက်သစ်တောဂေဟစနစ်၏ရာသီဥတုပြောင်းလဲမှုဒဏ်ခံရနိုင်ခြေရှိမှုဆန်းစစ်ခြင်း၊

၁.၅ ဒီဂရီပါရီရည်မှန်းချက်ပန်းတိုင်အောင်မြင်ရေးမြန်မာ့သစ်တောကဏ္ဍမြှင့်တင်ပေး

ဆန်းစစ်ခြင်း

ညွှန်ကြားရေးမှူး၊ ရာသီဥတုပြောင်းလဲမှုဆိုင်ရာဌာန၊ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန၊

သယံဇာတနှင့်သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဝန်ကြီးဌာန၊ မြန်မာ

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သစ်တောများသည် ၎င်းတို့၏အစာချက်လုပ်မှုစနစ်နှင့် ကာဗွန်အဖြစ်ပြောင်းလဲခြင်းလုပ်ငန်းစဉ်များ အရ လေထုထဲမှ မှန်လုံအိမ်ဓာတ်ငွေ့များစုပ်ယူဖယ်ရှားသူအဖြစ် သိပ္ပံနည်းကျအသိအမှတ်ပြု၍ တန်ဖိုးထားခြင်းခံရပါသည်။ သစ်တောများအနက် ဒီရေရောက်သစ်တောသည် ၎င်း၏ ထူးခြားသော ဂေဟစနစ်များတည်ရှိမှု၊ သဘာဝဘေးအန္တရာယ်များကို အံ့တုနိုင်သည့်သဘာဝတံတိုင်းအဖြစ် ရပ်တည်နိုင်မှုနှင့် ကုန်းတွင်းပိုင်းသစ်တောများထက် ကာဗွန်စုပ်ဖယ်ရှားမှုမြင့်မားခြင်း စသည့်လုပ်ငန်းစဉ်များကြောင့် အရေးပါလျက်ရှိပါသည်။ သို့ရာတွင် ကုန်းတွင်းပိုင်းနှင့်ဒီရေရောက်သစ်တော နှစ်မျိုးလုံးကို စံနစ်ကျ၍ စဉ်ဆက်မပြတ်သော အုပ်ချုပ်မှုအောက်တွင် မထားရှိနိုင်ပါက ၎င်းတို့သိုလှောင်ထားသော ဇီဝဒြပ်ထုများကို အခြေခံ၍ ကြီးမားသော မှန်လုံအိမ်ဓာတ်ငွေ့ပမာဏကို ထုတ်လွှတ်ကြမည် ဖြစ်ပါသည်။ မြန်မာနိုင်ငံ၏ သစ်တောဖုံးလွှမ်းမှုသည် ၁၉၉၀ နှစ်များအထိ နိုင်ငံဧရိယာ၏ ၅၇.၉၇ ရာခိုင်နှုန်းရှိခဲ့သော်လည်း ၂၀၀၅-၂၀၁၅ ကာလအတွင်း တစ်နှစ်လျှင် ၃၈၇,၅၂၇ ဟက်တာနှုန်းဖြင့် သစ်တောများပြုန်းတီးခဲ့ကြောင်း တွေ့ရှိရပါသည်။ ယခုအခြေအနေသည် လေထုထဲမှမှန်လုံအိမ်ဓာတ်ငွေ့များဖယ်ရှားရန်နှင့် ရာသီဥတု ပြောင်းလဲမှုလျှော့ချရေးအတွက် သစ်တောကဏ္ဍ၏ အထောက်အကူပြုမှု လျော့ကျလာစေပါသည်။ ရာသီဥတုပြောင်းလဲမှုဒဏ် ခံရနိုင်သောနိုင်ငံများဆိုးကျိုးခံစားရမည့် ၂ ဒီဂရီစင်တီဂရိတ်ပူနွေးမှုအဆင့်ကို ထည့်သွင်းစဉ်းစားလျက်ချမှတ်ခဲ့သည့် ကင်ကွန်း ၂ ဒီဂရီ စင်တီဂရိတ်ပန်းတိုင်ကို အားဖြည့်ရန်အလို့ငှာ ၁.၅ ဒီဂရီစင်တီဂရိတ် ပါရီပန်းတိုင်ကိုချမှတ်ခဲ့ခြင်း ဖြစ်ပါသည်။ ယခုသုတေသနနည်းလမ်းတွင် အဓိကအားဖြင့် မြန်မာ့ကမ်းရိုးတန်းတွင်ဆောင်ရွက်ခဲ့သည့် သုတေသနရလဒ်နှင့် သမိုင်းဝင်ရုံးမှတ်တမ်းများ၊ သိပ္ပံနည်းကျ သုတေသနစာတမ်းများအား ဆန်းစစ်လေ့လာခြင်းနှင့် စာရင်းအင်းစိစစ်တွက်ချက်မှုများ ပါဝင်ပါသည်။ ယခုလေ့လာသုတေသန ပြုမှု၏ရည်ရွယ်ချက်များမှာ ဒီရေတောဂေဟစနစ်၏ လိုက်လျောညီထွေဖြစ်နိုင်စွမ်းကိုမြှင့်တင်ခြင်း အပါအဝင် မြန်မာနိုင်ငံ၏စဉ်ဆက်မပြတ်သောသစ်တော စီမံအုပ်ချုပ်မှုစနစ်ဖြင့် ရာသီဥတုပြောင်းလဲမှု လျှော့ချရန်၊ မြန်မာနိုင်ငံ၏ရာသီဥတုပြောင်းလဲမှုနှင့် လိုက်လျောညီထွေဖြစ်စေရေး အကောင်အထည်ဖော်မည့် လုပ်ငန်းအစီအစဉ် အကောင်အထည်ဖော်နိုင်ရေး အထောက်အပံ့ဖြစ်စေရန်နှင့် ကုလသမဂ္ဂ ရာသီဥတုပြောင်းလဲမှုဆိုင်ရာမူဘောင်သဘောတူ စာချုပ် (ကွန်ဗင်းရှင်း) (UNFCCC) နှင့် ပါရီသဘောတူ စာချုပ်တို့အရ မြန်မာနိုင်ငံ၏ ကတိကဝတ်များပြည့်မီရေးဆောင်ရွက်နေသည့် အမျိုးသားအဆင့် အားထုတ်မှုများကို သိရှိနားလည်မှုမြှင့်တင်ပေးရန်တို့ ဖြစ်ပါသည်။ စွမ်းအင်ကဏ္ဍ၊ စိုက်ပျိုးရေး၊ သစ်တောနှင့် အခြားမြေအသုံးချမှုကဏ္ဍ၊ စွမ်းအင်

ချွေတာခြင်းနှင့် အခြားကဏ္ဍများ၏ စုစုပေါင်း ထုတ်လွှတ်မှုမှာ ၂၀၂၁-၂၀၃၀ ကာလတွင် ၈၄၂.၇၅ million tCO₂e ရှိနိုင်ကြောင်း တွက်ချက်ရရှိပါသည်။ ကဏ္ဍများအကြားတွင် သစ်တောနှင့် အခြားမြေအသုံးချမှုကဏ္ဍ (FOLU) ကြောင့် ထုတ်လွှတ်မှုပမာဏမှာ 504.56 million tCO₂e ရှိပါသည်။ နိုင်ငံ၏ဘဏ္ဍာငွေဖြင့်သုံးစွဲ၍ ထုတ်လွှတ်မှု လျှော့ချနိုင်မည့်ပမာဏမှာ ၂၀၃၀ အရောက်တွင် ထုတ်လွှတ်မှုစုစုပေါင်း၏ ၂၅ ရာခိုင်နှုန်းရရှိရန် ရည်မှန်းထားသော်လည်း တရားဝင်နှင့် တရားမဝင် သစ်နှင့်သစ်တောထွက်ပစ္စည်းထုတ်လုပ်ခြင်း၊ တောကောင်း၊ ဖုန်းဆိုးမြေ၊ မြေလွတ်များတွင် စိုက်ပျိုးမြေများတိုးချဲ့ခြင်းနှင့် သစ်တောမြေအား စိုက်ပျိုးမြေနှင့် စိုက်ခင်းများ (ရာဘာ၊ ဆီအုန်း၊ ကွမ်းသီး၊ ငှက်ပျောနှင့်အခြားအပင်များ) အဖြစ် ပြောင်းလဲခြင်းများသည် သစ်တောနှင့် အခြားမြေ အသုံးချမှုကဏ္ဍ၏ ရည်မှန်းချက်အောင်မြင်ရေးအတွက် ကြီးစွာသောဖိအားများဖြစ်ပါသည်။ အဖွဲ့အစည်းဆိုင်ရာ စွမ်းဆောင်ရည်တောင့်တင်းစေရေး၊ လူ့စွမ်းအား အရင်းအမြစ် စွမ်းဆောင်ရည်နှင့် စိတ်ပါဝင်စားမှုမြှင့်တင်ခြင်း၊ သက်ဆိုင်ရာဝန်ကြီးဌာနများအကြား ပူးပေါင်းဆောင်ရွက်မှုမြှင့်တင်ခြင်း၊ မူဝါဒအဆင့်နှင့် ပြည်သူလူထုတို့၏အသိအမြင် နိုးကြားစေရေး အားပေးခြင်း၊ ဥပဒေ သက်ရောက်မှု တိုးမြှင့်ခြင်းနှင့် သစ်တောများနှင့် ဒီရေတောဂေဟစနစ် အပါအဝင် ၎င်းတို့၏ဂေဟစနစ်များ ထိန်းသိမ်းကာကွယ်ခြင်းများအထူးအလေးပေးဆောင်ရွက်သင့် ပါကြောင်း ထောက်ခံတင်ပြအပ်ပါသည်။

အဓိကစကားလုံးများ။ ပါရီသဘောတူစာချုပ်၊ သစ်တောပြုန်းတီးမှု၊ သစ်တောနှင့်အခြားမြေအသုံးချမှု၊ မှန်လုံအိမ်ခတ်ငွေထုတ်လွှတ်မှု၊ NDC၊ ဒီရေတော

Assessing the vulnerability of Mangrove Ecosystem in Myanmar to Climate Change: Enhancing Myanmar Forestry Sector to meet 1.5-degree Paris Goal

1. Introduction

Climate system is naturally changing within its phenomena being driven by air quality of temperature, velocity, direction, vapor or gases content, elevation, topography, and location. But it provides us with negative impacts when its system internal change is influenced by human factors. Forests are scientifically acknowledged and valued as an incomparable remover of CO₂ one major GHGs from the atmosphere due to their photosynthesis system and carbon conversion process. Ecotones are defined as interfaced or transition zones or areas of sharp environmental gradients between two or more ecosystems and playing important role in landscaping (Smith, et al., 2013). If it is not under the sustainable and systematic management, it releases a huge amount of GHGs particularly CO₂ into the atmosphere based on its biomass content. Even though Myanmar had forest cover accounted for 57.97% of its land area until 1990, 387,527 ha of its forest were yearly lost during the period 2005-2015. This situation makes forestry sector weaken to remove GHGs from the atmosphere and less support climate change mitigation.

Myanmar is identified as one of the most vulnerable countries to the climate change impacts even though it is the second largest landmass country possessing diverse natural resources and almost complete diverse topography. To tackle the climate change by means of both mitigation and adaptation measures, Myanmar has signed on UNFCCC in 1992 and Paris Agreement in 2016. 1.5°C Paris Agreement goal has been set up to strengthen the Cancun 2°C goal in consideration with the vulnerable countries about the adverse consequences of a 2°C warming level. As a Party, Myanmar has to set out publicly its nationally determined contributions – NDC) by mentioning its plans to contribute to the international effort to secure a sustainable future for all by keeping the global temperature rise since pre-industrial times well below two degrees Celsius, with a preference to limit it to 1.5 degrees (UNFCCC, 2021).

Myanmar REDD+ Readiness Roadmap, composed with six sections, has been developed in 2013 after two years of being a partner country of the UN-REDD Programme in 2011 (ForestDepartment, 2017). It's first "Summary of Information (SOI)" has been submitted to UNFCCC in August 2020.

2. Objectives

Objectives of this study are to enhance climate change mitigation through Myanmar sustainable forest management system, to support Myanmar Nationally Determined Contributions – NDC update implementation, and to raise awareness on the national efforts to meet Myanmar's commitment to both United Nations Framework Convention on Climate Change and Paris Agreement.

3. Materials and Methods

The research method mainly include review on historical office documents, scientific research papers, and statistical analysis. Emission from deforestation has been calculated by using following formula (MONREC, 2021).

$$E_f = A * EF_f$$

Where: E_f =Emission from deforestation, EF_f =Emission factor (125.43 tonsCO₂e/Ha) (FREL, 2018)¶)

The emissions reduced per stove (1.3 tCO₂e) was calculated in weighted value method based on Clean Development Mechanism (CDM) projects submitted to the UNFCCC. The Fuelwood emissions factor (112,000kgCO₂e/TJ) as of IPCC Good Practice Guidelines (2006) was adopted (MONREC, 2021).

Research made by (Win, et al., 2019), who developed and applied a Modified cluster transect surveys, in Myanmar coast particularly at Ayeyarwaddy Delta Coastal Zone – ADCZ during 2015 – 2017 confirmed with mangrove forest’s key functions having of unique ecosystems, natural shield to against natural disaster, and higher carbon sequestration than terrestrial forest among the forest in Myanmar. To understand the land use and land cover status, classification was made by generating the Landsate8 image (acquired in Feb 2015) with Google Earth Engine (GEE) platform and the ArcGIS 10.2 programme (Win, et al., 2019).

4. Results

4.1. NDC target for FOLU sector

Myanmar has successfully developed its updated Nationally Determined Contributions – NDC by following its commitments to both UNFCCC and Paris Agreement (Article 4, paragraph 2) and uploaded its NDC to the UNFCCC NDC registry portal on 3rd August 2021 (UNFCCC, 2021). Myanmar NDC update has been developed based on its INDC submitted to the UNFCCC in 2015 one year before signed on the Paris Agreement which mainly focused on adaptation, Disaster Risk Reduction (DRR), and mitigation. Total emission of 842.75 million tCO₂e during 2021-2030 was calculated for Energy, FOLU, Energy Efficiency, and other sectors in the NDC (MONREC, 2021). Among the different sectors, FOLU sector was responsible for emission of 504.56 million tCO₂e based on FRL baseline emission from deforestation (

Table 2: Unconditional GHG emission scenario from FOLU with a target of 25% net reduction by 2030 (MtCO₂e)

Year	FRL Baseline emissions Deforestation (MtCO ₂ e)	Emissions from deforestation (MtCO ₂ e)	FRL Baseline enhancement (MtCO ₂ e)	Un-conditional Enhancement (MtCO ₂ e)	BAU Emission (FRL Baseline emission – enhancement) (MtCO ₂ e)	Net annual emissions unconditional (MtCO ₂ e)	Acc ER in % of FRL baseline un-conditional
2021	53.807	51.922	(3.351)	(2.067)	50.456	49.855	-1%
2022	53.807	50.103	(3.351)	(2.605)	50.456	47.498	-4%
2023	53.807	48.347	(3.351)	(3.431)	50.456	44.916	-6%
2024	53.807	46.653	(3.351)	(4.356)	50.456	42.297	-9%
2025	53.807	45.019	(3.351)	(5.381)	50.456	39.637	-11%
2026	53.807	43.441	(3.351)	(6.506)	50.456	36.935	-14%
2027	53.807	41.919	(3.351)	(7.731)	50.456	34.188	-16%
2028	53.807	40.450	(3.351)	(9.055)	50.456	31.395	-19%
2029	53.807	39.032	(3.351)	(10.479)	50.456	28.554	-22%
2030	53.807	37.665	(3.351)	(12.003)	50.456	25.662	-25%
Total 2021 - 2030	538.075	444.552	(33.513)	(63.616)	504.56	380.937	-25%
Annual Average	53.8075	44.4552	(3.3513)	(6.3616)	50.456	38.0937	-25%

4.2. Policy guiding tools for FOLU target implementation

As the NDC targets are the national level commitments given to the Paris Agreement under the UNFCCC, policy guiding tools and willingness are crucial. Former NECCCCC has been reformed into National Environmental Conservation Committee chaired by the union minister for the Ministry of Natural Resources and Environmental Conservation in 2021. Myanmar climate change policy, strategy, and master plan are in place. Specific policies, strategies and plans for the forestry sector to guide the implementation of the FOLU targets include 1) Forest Law 2018 (to contribute to “international agreements relating to conservation of forests and conservation of environment”), 2) Myanmar’s 30- year National Forestry Master Plan (2001-2002 to 2030-2031 (to “prevent extreme weather conditions and to support agricultural development by conserving natural forests and establishing forest plantations”, 3) the Myanmar Reforestation and Rehabilitation Program (MRRP) from 2017-2027 (to conserve 0.59 million hectares of Reserved Forests (RF); engage in management of 0.25 million hectares of plantations in public and private lands; undertake Community Forestry Management and Agroforestry across 0.3 million hectares and establish Reserved Forests and Protected Public Forest (PPF) across 4.1 million hectares.), 4) the National REDD+ Strategy (to reduce the annual rate of deforestation by 50% by the end of 2030 against the baseline deforestation stipulated in the 2019 Myanmar Forest Reference Level.), and 5) the Land-Use Policy (2016), establishes processes to ensure more democratic land-use planning, and which will be supported by a new National Land Law, currently under development. and Table 2).

Table 1: NDC targets for FOLU sector by 2030 and implementation actions

Sector	Resource	BAU emission	Unconditional target emission	Conditional target emission	Actions
AFOLU: FOLU	Emission reduction via minimizing deforestation	504mtCO ₂ e (annual deforestation rate: 0.429 m ha) (FREL)	380 mtCO ₂ e (Minimizing 25% deforestation)	252 mtCO ₂ e (Minimizing 25% deforestation)	MRRP (unconditionally remove 93 MM t CO ₂ e (251,000 ha of new forests) via forest plantation establishment while conditionally (340,000 ha), National REDD+ Strategy and Action Plan and Land Use Policy
Energy efficiency in FOLU			0.35 mtCO ₂ e (reduction)	-	Distribution of 0.27 million fuel efficient stoves

Table 2: Unconditional GHG emission scenario from FOLU with a target of 25% net reduction by 2030 (MtCO₂e) (MONREC, 2021)

Year	FRL Baseline emissions Deforestation (MtCO ₂ e)	Emissions from deforestation (MtCO ₂ e)	FRL Baseline enhancement (MtCO ₂ e)	Un-conditional Enhancement (MtCO ₂ e)	BAU Emission (FRL Baseline emission – enhancement) (MtCO ₂ e)	Net annual emissions unconditional (MtCO ₂ e)	Acc ER in % of FRL baseline unconditional
2021	53.807	51.922	(3.351)	(2.067)	50.456	49.855	-1%
2022	53.807	50.103	(3.351)	(2.605)	50.456	47.498	-4%
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4.3. Mangrove Ecosystem and climate change

According to the land use land cover classification result confirmed with presence of 94,677.3 ha (16%) of mangrove forest, terrestrial species area of 29,576.88 ha (5% of ACDZ area), and salt or aquatic farm and saline intrusion area of 37,406.61 ha (6% of ACDZ area) in ADCZ in 2015 (Win, et al., 2019) (Figure 1). Win, et al. (2019) document altogether 30 mangrove tree species: Six species; *Ceriops decandra** (CD), *Excoecaria agallocha** (EA), *Phoenix paludosa** (PP), *Heritiera forms** (HF), *Aegiceras corniculatum** (AC); observed in both HS and LS area are

likely to have higher adaptive capacity to a wider salinity range than others. BG is likely to be the most vulnerable species to both MSL and salinity change (Figure 2). Mangrove ecosystem is likely to be vulnerable to the positive trend of atmospheric temperature $0.202\text{ }^{\circ}\text{C/yr}$ ($r^2 = 0.44$) and negative trend “from $51.8 - 54.2\text{ mm/pendat}$ in 1981 to $47.83 - 49.95\text{ mm/pendat}$ in 2015” while it is adaptable to annual MLR of 3.4 mm/yr via sedimentation rate of $0.87\text{ cm/spring tide}$ (Win, et al., 2019).

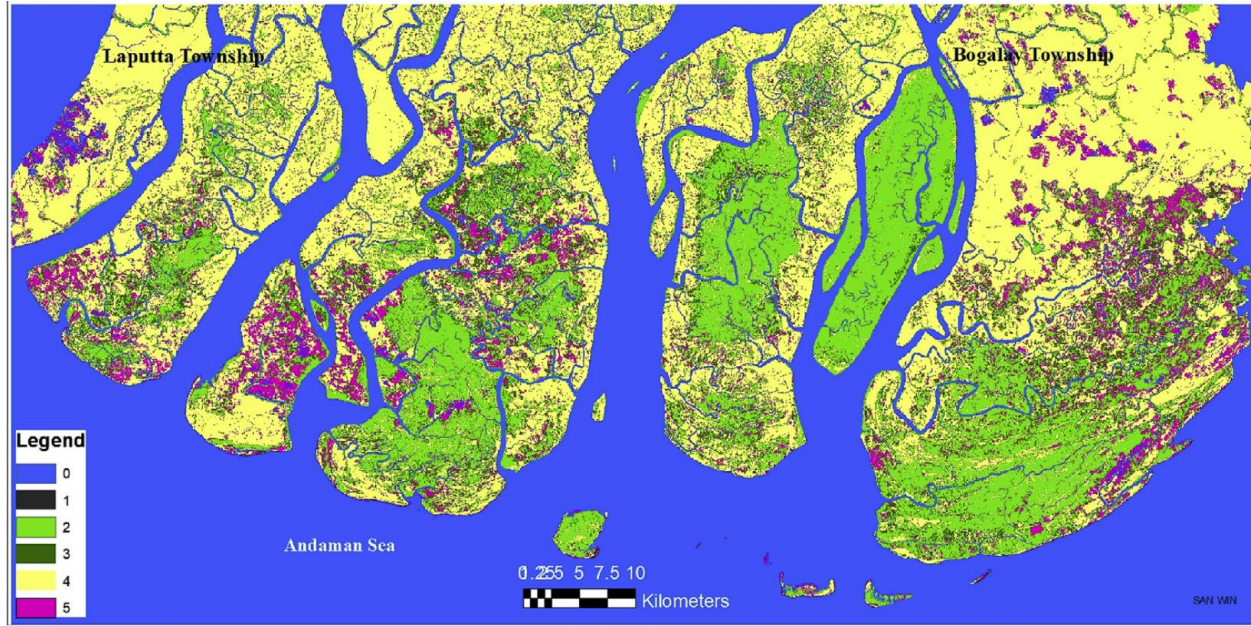


Figure 1: Land Use Land Cover Status in Ayeyarwaddy Delta Coastal Zone in 2015. Legend: 0 sea water, 1 urban, 2 mangrove, 3 terrestrial forest, 4 agriculture, and 5 aquaculture farm and/or salt intrusion land (Win, et al., 2019).

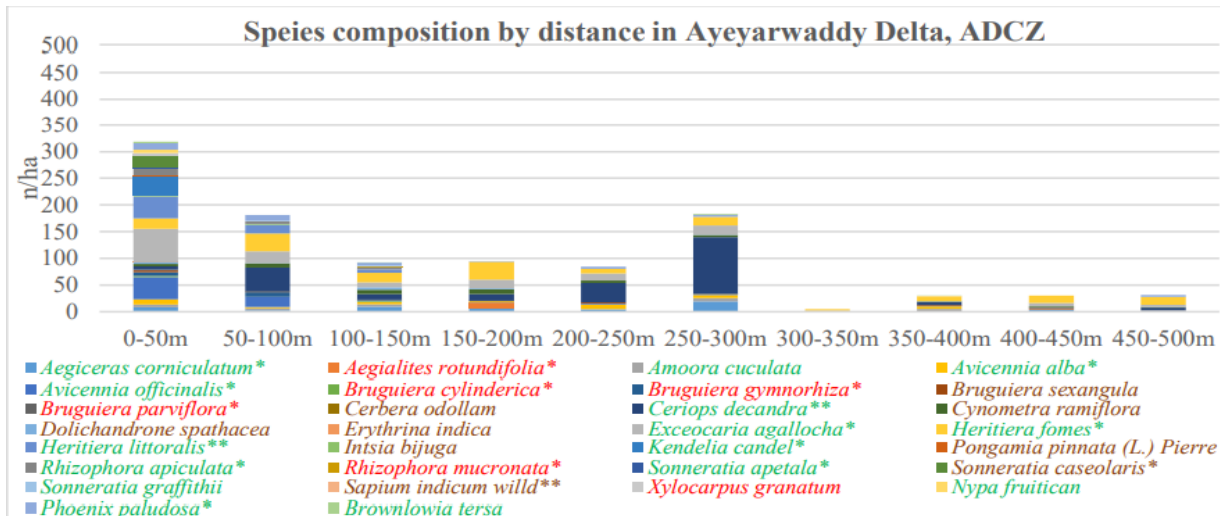


Figure 2: Tree species composition and density by distance in Ayeyarwaddy Delta Coastal Zone (Green word = species found in both low and high salinity areas (Laputta and Bogalay Townships), Red word = unique species found only in high salinity area (Laputta), Brown word = unique species found only in high salinity area, Bogalay) (Win, et al., 2019).

5. Discussion

Climate change commitments are providing the member countries parties with not only to access the international technology and finance but also sustainable socio-economic development of the parties through having better climate and ecosystems and higher resilience to the climate resilience, and lesser loss and damage. Among different sectors: Energy, AFOLU, Energy Efficiency, Myanmar committed to unconditionally reduce its net emissions by 25% by 2030, against the 2005 – 2015 baselines of emissions and removals. Intermediate achievement in reduction of 11% of the national deforestation by 2025. Twenty sixth Conference of Parties – COP26 has been organized by the UK and UNFCCC. An important decision made by the COP26 alarmed the parties to recognize that limiting global warming to 1.5 °C requires rapid, deep and sustained reductions in global greenhouse gas emissions, including reducing global carbon dioxide emissions by 45 per cent by 2030 relative to the 2010 level and to net zero around midcentury, as well as deep reductions in other greenhouse gases (UNEP, 2021).

Restoration and conservation of mangrove ecosystem are leading to more coastal carbon storage and offering many valuable ecosystem services to the tropical coastal zone and its inhabitants (Alongi, 2014). As much mangrove biomass and carbon stocks higher, there are proportionally higher removal of CO₂ from the atmosphere. 1% of global forest area, store 14% of global forest carbon in the world (Alongi, 2012; Win, et al., 2019). Mangrove ecosystem vulnerability is likely to be reduced by presence of higher flora species composition and tree density. The salinity tolerance level, water salinity value in mangrove ecosystem, soil bulk density, salinity and pH, and ground elevation and/or duration of tide water inundation are also influencing on the flora composition and tree density (Win, et al., 2019).

Weakness in law enforcement, limited quantity, capacity, and facility of human resource and institution, overlapping or not clear items among sectoral policy, laws, and rules, and less number of researches on mangrove ecosystem, coastal ecosystem, etc. are observed as barriers in mitigating process of mangrove deforestation.

6. Consultation

Unconditionally 25% of emission is to be reduced by 2030 but major threats; legal and illegal timber and forest product extraction, agricultural expansion on Virgin, Fallow and Vacant land, and transformation of forest land to agro-business plantations (rubber, oil palm, betel nut, bananas, others) are likely to depress the success of Myanmar FOLU sector.

Strengthening both institutional capacity, human resource capacity and willingness, collaboration between and among line ministries, encouraging policy level and public awareness and participation, enhancing law enforcement, and improving technical and financial sufficiency are recommended for avoiding being a noncompliance country but having a successful implementation of FOLU sector targets in Myanmar.

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