MINISTRY OF ENVIRONMENT AND FORESTRY

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OPERATIONAL PLAN

INDONESIA'S FOLU Net Sink 2030

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OPERATIONAL PLAN

INDONESIA'S FOLU *Net Sink* 2030

EXECUTIVE SUMMARY

National Commitment to Greenhouse Gas Emissions Reduction

The increase in greenhouse gas concentration in the atmosphere as a result of human activities has caused global warming and climate change, whose impacts are even more severe. Scientific analysis shows that the adverse effects of climate change can be avoided by keeping the global temperature rise no more than 2oC to 1.5oC compared to pre-industrial times. To avoid the adverse effects of climate change, the world agreed through the United Nations adopted in Paris in 2015 that the rate of greenhouse gas emissions must be reduced as low as possible and reach NZE in the second half of the mid-twentieth century. It is close to zero and the remaining emissions can be absorbed by land and forest system or technology such as carbon capture and storage, hence net emissions become zero (net-zero emission or NZE).

The Government of Indonesia (GoI) has ratified the Paris Agreement (PA) and has submitted its commitment to reduce greenhouse gas emissions with an unconditional target of 29% and conditional target (with international support) of 41% compared to business as usual (BaU) emission levels by 2030. The Indonesian government has conveyed a long-term vision to develop a climate-resilient low-carbon development pattern in line with the Paris target called the Low Carbon Compatible with Paris (LCCP) scenario. In this scenario, greenhouse gas emissions will reach a peak of 1,240 million tonnes of CO2e by 2030 and then gradually decline to reach 540 million tCO2e in 2050. It is expected that net-zero emissions (NZE) will be achieved by 2060 or earlier (**Figure S1**).

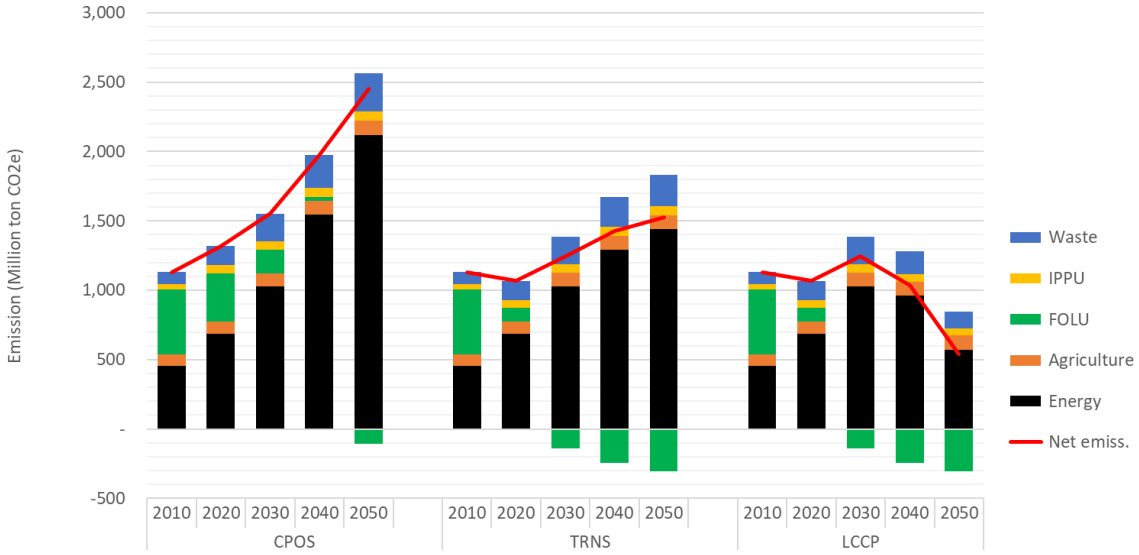

Figure S1. Greenhouse gas emission pathways under current policy (CPOS), transition (TRNS) and low carbon development compatible with Paris (LCCP) scenarios (Source: Indonesia LTS- LCCR, 2021)

In the long-term strategy, the emission level in the LCCP scenario is much lower than the current policy scenario (CPOS)—an extension of the unconditional NDC scenario. In the LCCP, the rate of increase in energy sector emission is slowed down, while the land and forestry sector (FOLU), which was previously a net emitter, will turn into a net sink by 2030. The FOLU sector is expected to continue to increase its net sinks until 2050. This sector has a big role in efforts to achieve the national NZE target, especially to offset emissions from sectors that are difficult to abate, such as the energy sector (**Figure S2**). Significant efforts to reduce FOLU sector emissions and convert them to net-sinks by 2030 (in the LCCP scenario) will largely depend on the success of the following actions:

a) reducing emissions from deforestation and forest degradation by expanding protected natural forest, increasing community participation, and strengthening partnership with the community in forest management;
b) increasing the carbon sequestration capacity of natural forests by reducing degradation and increasing forest regeneration through enrichment or implementation of a sustainable forest management system;
c) increasing the carbon sequestration of land systems by maximising the use of unproductive or low-carbon land for the development of forest plantations, and other perennials (industrial crops);
d) reducing emissions from fires and peat decomposition by improving peatland management systems;
e) law enforcement

FOLU sector emission projections in unconditional NDC and LTS LCCP scenarios as seen in **Figure S2**. The aggregate net emissions from the FOLU sub-sector for the LTS scenario can be seen in **Figure S1** (Source: Indonesia LTS-LCCR, 2021; Indonesia NDC, 2021).

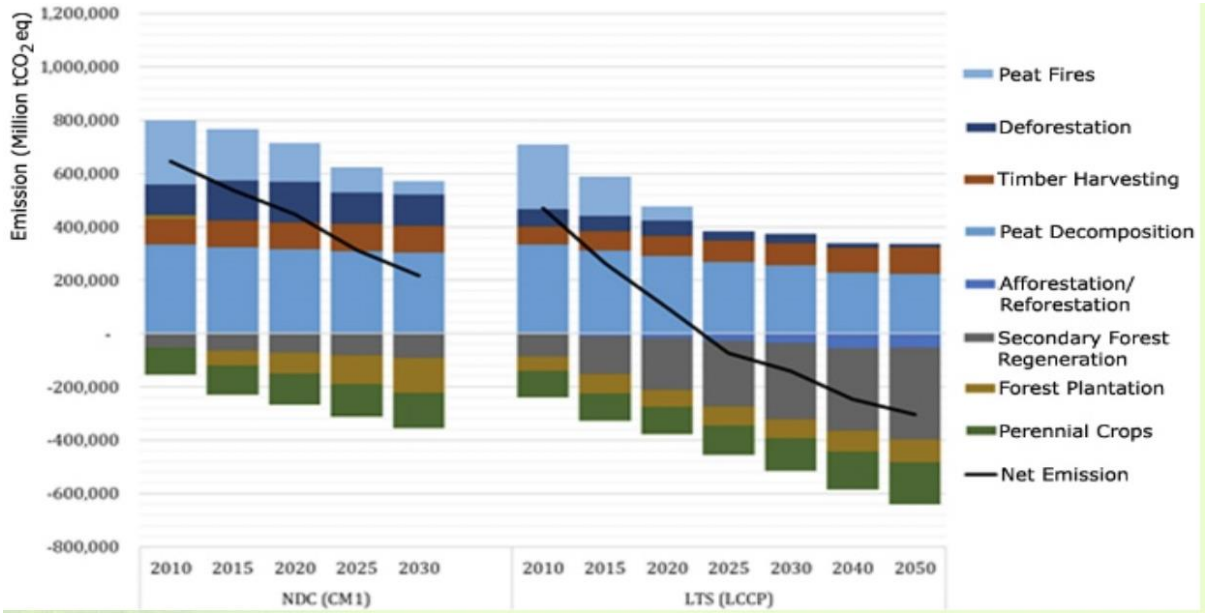

Figure S2. FOLU sector emission projections in unconditional NDC and LTS LCCP scenarios

In the context of the forestry and land sectors, the successful achievement of net sinks must indirectly synergise with the agricultural sector. Increasing land-use efficiency and agricultural productivity are keys to reducing pressure on forests. Huge investment is needed to produce very high-yielding varieties and low-carbon and climate-adaptive farming technologies. In addition, efforts to diversify food and increase the forestry sector's contribution through Non-Timber Forest Products (NTFP) in order to meet increasing food needs and to suppress the conversion of productive agricultural land, particularly in Java, will help reduce pressure on forestlands for agricultural expansion.

The demand for developing low-carbon agricultural and forestry development is in line with the development of the international trade system. Currently, several international trade or export partner countries (China, America, Japan, Britain, South Korea, Australia, etc.) have signalled their country's commitment to achieving net-zero emissions—most of which will be achieved by 2050. Therefore, the demand for low carbon-intensive agricultural commodities will tend to increase. A key strategy in reducing the carbon footprint of agricultural products produced is to increase land-use efficiency through mixed farming systems such as the integration of livestock, food crops, plantations, and forestry. This huge effort requires international support both in the context of research collaboration, investment, and technology transfer.

Spatial Information for Forest Sustainable Development and Management

The development of a low carbon, sustainable and resource-efficient FOLU sector, which contributes to the achievement of sustainable development goals, requires spatial information. In this regard, the preparation of operational plans for the implementation of NDC mitigation actions towards the FOLU Net Sink 2030 uses three main spatial information. These include (1) map of bio- geophysical indices (**IBGF)**, (2) directional map for optimising forest utilisation based on environmental services index (**IJLH**), and (3) map of institutional typology of the forest management unit (**TPH**).

The IBGF provides an overview of the condition of the area in relation to the level of risk of the area to deforestation and forest fires, and the potency of the area in sequester carbon. The IBGFs (risk of deforestation and fire, and potency of carbon uptake) are integrated to define the priority of the area for the implementation of mitigation actions called as Location Priority index (**IPL**). The **IJLH** is developed based on the presence of high conservation values (HCV), forest quality (carbon stocks and crown density), and the role of the area in providing environmental services. The IJL will define the direction in optimising the utilisation of forest into four categories, namely (i) protection, (ii) production, (iii) rehabilitation, and (iv) conversion zones.

Spatial information on the typology of institutions describes the socio-economic conditions of the community (social capital) and the institutional capacity of the forest management unit (FMU). The social capital is assessed based on the fraction of the forest area occupied by the community, and the institutional capacity is assessed based on the condition of human resources (HR), facilities and infrastructure, the existence of the programme, and the age of the forest management unit. The FMUs are classified into four types, namely forest management units with high social capital and institutional capacity (Type-1), forest management units with high social capital conditions but low institutional capacity (Type-2), forest management units with low social capital conditions but high institutional capacity (Type-3), and forest management units with low social capital and institutional capacity (Type 4). This information is needed in formulating a strategy for the implementation of mitigation programmes, which are integrated and synergistic with the involvement of the community and other parties, and thus contribute to the achievement of SDG's goals. To build good coordination and synergy, it is necessary to pay attention to the existence of strong institutions at the site level.

The three spatial information (**IJLH, IPL**, and **TPH**) becomes "***template***" that can be used to assist in conducting policy reviews and taking corrective actions in order to improve the management of forests and their ecosystems. Use of the **templates** along with specific or thematic spatial information will assist in formulating corrective actions to be taken by each directorate of the Ministry of Environment and Forestry. Corrective actions are directed at being able to (i) change the direction of forest management which initially only focused on timber management to forest landscape management, (ii) resolve conflicts related to forest tenure cases, (iii) implement community-based forest management by providing access to community to manage forest through the social forestry and partnership programme, (iv) internalise the principles of environmental carrying capacity in the preparation of Indonesian National Forestry Plan (RKTN) 2011-2030 as a macro spatial direction for forestry development and (v) implement a "green economy" policy, balancing the added economic value of forestry businesses and the use of environmental services while maintaining forest sustainability and environmental quality as well as ecosystem balance to achieve sustainable development. Success in implementing corrective actions will lead to significant emission reductions in this sector. The relationship between the three new maps and thematic maps in determining the direction of integrated programmes and activities is presented in **Figure S3**.

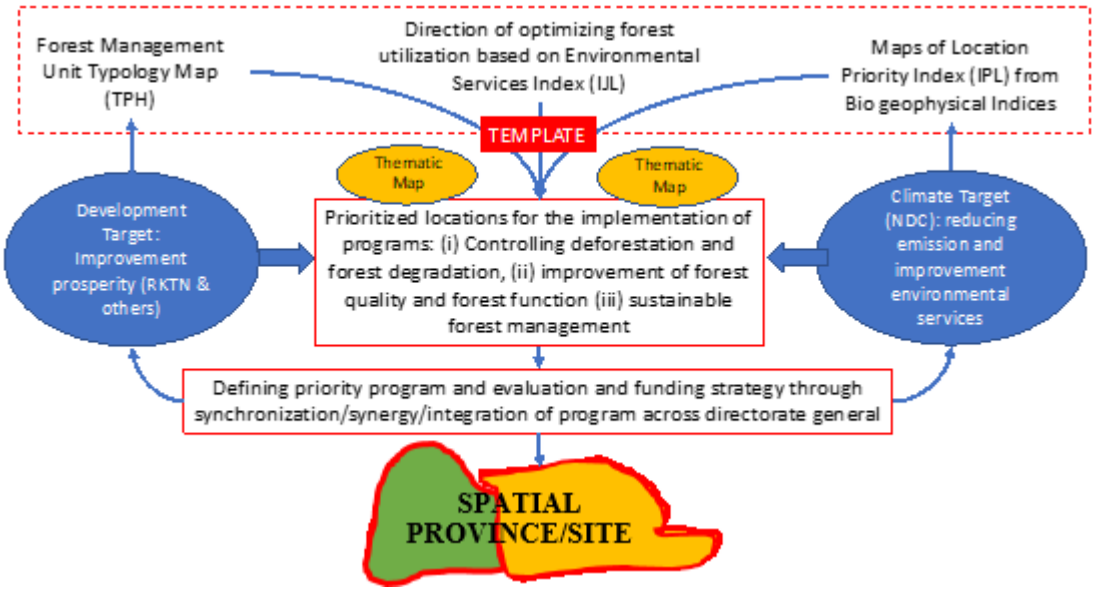

Figure S3. Process of using the template in defining mitigation programmes/actions and priority locations for their implementation towards the FOLU Net Sink 2030

FOLU Sector Mitigation Action towards 2030 Net Sink

The determination of priority locations for the implementation of mitigation actions using the "***Template***" is as follows:

1. Prevention of deforestation and degradation (DD) of natural forests. The priority locations for the implementation of this mitigation activity are areas covered by natural forests located in relatively high IPL and under protection and production zones based on IJL. Locations with high IPL have a high risk of being converted to non-forest or degraded. The area still covered by natural forest under protection and production zone must be maintained to ensure the continuity of the forest in providing environmental services and forest products.
2. Prevention of Forest Degradation in Concessions (Forest Utilisation Business Permit or PBPH). Prevention of degradation of forested lands in PBPH under protection zone needs to be carried out with a management model that is directed to the use of NTFPs, given that some of the areas are still in the form of primary natural forest.
3. Plantation forest development in PBPH-HT. Priority locations to establish plantation forests to meet industrial timber needs in PBPH-HT concession and social forestry areas (PIAPS) are all unproductive lands throughout the concession area in the production zone. Unproductive land located in the rehabilitation zone is used for a non-rotation rehabilitation programme.
4. Sustainable Forest Management (PHL). Priority locations for the implementation of PHL activities through forest enrichment activities (enhanced natural regeneration, ENR) and low impact logging technology (RIL) are in concession areas, both PBPH-HA and PBPH-HT. ENR activities are directed at concession areas, in which the land cover is dominated by natural forests located in the conversion and rehabilitation zone, including secondary forest in the production zone at high IPL. The application of SILIN is that ENR can increase the productivity of natural forests up to 3–4 times of the current productivity or equivalent to 90–120 m3/ha/cycle. Meanwhile, RIL activities

are directed at concession areas whose land cover is still covered by primary forest, which is included in the production zone.

5. Enhancement of forest carbon stock (PCK). To enhance forest carbon stocks, land rehabilitation is undertaken either within dryland or wetland (Mangrove and Swamp Forests)—both by planting trees that can be harvested for wood (rotation) and those that cannot be harvested (non-rotation). For rehabilitation with rotation, priority locations are lands in production forest with relatively high IPL covered with unproductive lands and crop lands located within the production zone that are not peatlands. Meanwhile, for rehabilitation without rotation, priority locations are lands in both production and protection forests with relatively high IPL. These areas have land cover that comprises unproductive, seasonal, and perennial crops located in the protected zone and not on peatlands. Rehabilitation activities with land cover that comprises seasonal and perennial crops are in the form of agroforestry activities.
6. Peatland Management. To reduce emissions from peat decomposition and fires, peatland management activities should be implemented through the improvement of water management and restoration (rewetting, revegetation/rehabilitation, and revitalisation). Improvements in water management are prioritised in PBPH and HGU with land cover of plantation forests and plantation agriculture, respectively. For restoration activities, the priority locations are peatland in all forest functions with high IPL. For land with land cover that is unproductive, the activities are directed to restore the peatland by rewetting the land, thus allowing for the regeneration of forest naturally, or enriched. For lands that have been utilised by the community for seasonal and perennial crops outside concessions, the activities are directed to restore the land by developing paludiculture system.
7. Natural Forest Conservation. The existing natural forest, both inside forest areas (conservation forest, protection forest, and production forest) and outside forest area (APL) must be maintained—one of which is through conservation activities. Natural forest conservation outside the conservation area is carried out to maintain high conservation value areas, based on IJL designated under the protection zone.

Based on the criteria for determining the priority location above and taking into account the emission reduction target towards the 2030 net sink, the distribution of the area for the implementation of mitigation actions in each forest function is presented in Table S1. To build synergies between the Ministry of Environment and Forestry with other partners in the priority areas, it is necessary to pay attention to institutional typology. The FMU with Types 1 and 3 generally have a high institutional capacity and thus they are expected to be able to coordinate and build synergies between programmes from various organizations at the site level. Meanwhile, in priority areas where the FMU Types are 2 and 4, the institutional capacity is still low, and thus it is necessary to carry out institutional strengthening activities.

Table S1. The area of the implementation of the mitigation action programme according to area stakeholders

Area	Type of Management	Deforestation/ Degradation[3]	Degradation in Concession	PFD	SFM[5]		EFCS[5]		PLM		HCVF[6]	Total[8] (Ha)
				HT/HTR[4]	ENR	RIL	Rotation	Non Rotation	WM[4]	Restoration[5]		
Non-Forest area (APL)	PEMDA-Non HGU	3.973.073	-	-	-	-	1.640.824	92.689	-	-	1.350.742	5.706.586
APL – HGU	PEMDA-HGU	642.685	-	-	-	-	349.600	34.499	956.682	65.769	440.471	2.049.234
Conservation Forest	Conservation	915.775	-	-	548	-	-	647.229	-	9.351	-	1.572.902
Protection Forest	Ptn-Non SF	476.196	-	-	4.597	-	-	126.185	-	-	14.128.824	606.978
	Ptn-SF	71.728	-	-	1.060	-	-	39.235	-	43.440	1.459.031	155.464
Production Forest	Pdn-Non Concession	942.184	-	-	3.260	-	146.198	231.225	-	-	11.095.028	1.322.867
	Pdn-CPF	215.003	-	-	1.882	-	317.243	128.576	-	763	840.150	663.467
	PBPH-KAYU TUMBUH ALAMI	613.324	4.398.626	-	110.502	1.460.332	321.205	6.508	-	18.772	5.460.254	6.929.270
	PBPH-HT	1.974.995	233.885	1.346.427	118.953	64.122	1.243.630	383.201	718.021	210.408	1.443.708	6.293.643
	KPHP-SF	324.310	-	697.901	2.627	-	77.730	177.058	-	147.428	1.750.410	1.427.053
	PBPH-RE	326.313	58.130	-	2.859	-	22.768	20.596	-	9.209	360.930	439.874
Peatland Management by BRGM[7]		-	-	-	-	-	-	-	-	1.382.019	-	1.382.019
TOTAL		10.475.586	4.690.641	2.044.328	246.288	1.524.454	4.119.197	1.887.000	1.674.703	1.887.159	38.329.548	28.549.356
TARGET of Net Sink 2024[1]		**3.142.141**	**1.705.000**	**9.307.332**		**1.413.203**	**1.951.493**	**1.756.344**	**785.439**	**1.996.762**		
TARGET of Net Sink 2030[1]		**4.225.877**	**2.282.500**	**11.227.332**		**2.207.061**	**2.787.847**	**2.509.062**	**946.050**	**2.724.866**		
Progress until 2019[2]		**4.803.000**	**441.416**	**5.116.662**		**436.319**	**2.734.992**	**622.269**	**N.A.**	**835.288**		

[1]As calculated based on the LTS-LCCP target (KLHK, 2021), the value shows the cumulative target since 2011 (except deforestation and forest degradation, cumulative since 2013) and has not been corrected with the actual historical value of 2013–2020. The target area for increasing carbon stock and peat restoration activities has not been multiplied by the survival rate. [2]The area for preventing deforestation and forest degradation is calculated based on the area of natural forest that is under the production and protection zone with IPL 6–9, areas with a high level of deforestation risk. [3] Areas for forest plantation development and peat water management in concession areas (PBPH and HGU) are in all IPLs 1-9. [4]Areas for sustainable forest management (ENR and RIL), increasing carbon stocks (rotational, non-rotational), and peat restoration are at high IPL in accordance with the emission reduction target to achieve net sinks. [5] High conservation entry areas are areas that are still covered by natural forests outside the conservation forest in IPL 1–9, and in the protected zone based on IJL. [6] The total area for implementation of mitigation actions does not include high conservation. [7]BRGM is an institution mandated to carry out peat and mangrove restoration activities in 7 provinces (Jambi, Riau, South Sumatra, West Kalimantan, Central Kalimantan, South Kalimantan, and Papua), both inside and outside the forest area. Meanwhile, the 7 provinces outside remain under the authority of each responsible agency. Specifically, restoration outside forest areas (APL) that are not in HGU is by the Directorate General of PPKL. Note: PEMDA: Local Government; PBPH: Forest Utilisation Business Licensing; PFD: Plantation Forest Development; SFM: Sustainable forest management; ENR: enrichment; RIL: Reduced Impact Logging; EFCS: enhancing forest carbon stocks; PLM: peatland management; SF: Social Forestry; HCVF: High Conservation Value Forest. [8]Total area without calculating HCV.

Implementation of FOLU Sector Mitigation Actions Towards Net Sink 2030

a. Protection of forests from deforestation and degradation

The results of the spatial template analysis show that the natural forested areas have a high risk of deforestation that reaches 10.48 million hectares in various forest functions. The highest risk is outside the forest area (APL) and the lowest risk is inside the PBPH HT (Table S1). Commonly, the threat of deforestation is divided into planned deforestation and unplanned deforestation. Planned deforestation is the legal conversion of natural forest to non-forest, including within the production zone intended for cultivation activities (production directive) and HPK that has the potential to be converted into other uses. Unplanned deforestation is a change in natural forest cover to non-natural forest caused by either illegal activities (forest encroachment) or natural disasters, such as fires.

Based on the LCCP scenario (MoEF, 2021), the total area of natural forest that can be converted until 2050 is limited to 6.8 million hectares. Therefore, to maintain the target towards a net-zero emission, natural forest conversion must be reduced as low as possible.

b. Protection of forest degradation in concession areas

Emissions from forest degradation occur in the PBPH-HA concession area due to timber harvesting activities. The protection of primary natural forests in the concessions includes protection from planned and unplanned degradation. Protection from planned degradation involves revising the forest management plan to maintain primary natural forests exclusively for NTFP, while that of unplanned degradation focuses on the disturbance of primary natural forests maintained within the concession area. For the achievement of the 2030 net sink target, the upper limit for primary forest degradation is 2.28 million hectares. The incentive scheme for concessions to change their business plans from timber forest production into NTFPs or environmental services in primary forest areas is needed.

c. Plantation forest development

To achieve emission reduction targets, efforts must be taken to accelerate the development of industrial forest plantations. This will help to reduce dependence on natural forests supplied at the domestic and international level for industrial timber. Based on projections of future wood demand of the Indonesian National Forestry Plan (RKTN), there is a need for industrial forest plantation areas. The development of the forest to date is estimated to be 11.2 million hectares (Table S1). Based on template assessment, the potential area available for forest plantation development in the PBHP HT and PIAPS areas is only 2.04 million hectares. With the progress of plantation forest development to date reaching 5.12 million hectares, there is still a shortage of 4.07 million hectares. To fulfil this deficiency, plantation forest development can be carried out in concession areas already occupied by the community for cultivation of seasonal and perennial through social forestry programme under the Forestry Partnership scheme. As part of the Rehabilitation with Rotation activity, one of the ways to meet the shortage is to develop plantations forests that are integrated with plantation and agricultural crops in agroforestry systems. This is done through the expansion of areas for social forestry in Community Plantation Forests (HTR).

d. Sustainable Forest Management (SFM)

The availability of land to increase carbon stocks (rehabilitation) is limited, and the increase in carbon uptake can be done by increasing the absorption capacity from secondary forests through ENR and RIL. To achieve the net sink target (at least until 2030), the concession area that has implemented a sustainable forest management system through enrichment activities (such as the application of SILIN) and RIL will have to reach 2.2 million hectares (Table S1). However, the progress of the implementation of SILIN and RIL activities until 2019 has only reached 0.436 million ha. As a result, this makes the implementation of SFM towards the net sink target until 2030 to be at least 1.77 million hectares. Based on the analysis, the potential area for RIL implementation reaching 1.52 million ha in the PBPH KAYU TUMBUH ALAMI and PBPH-HT and the ENR implementation covering an area of 0.25 million ha spread over several forest functions (**Table S1**).

e. Forest and land rehabilitation

Rehabilitation activities with rotation are part of the mitigation action to increase carbon stocks. To achieve the FOLU net sink target, the area rehabilitated with a rotation system until 2030 reaches 2.79 million hectares (**Table S1**). The progress of the rehabilitation with rotation until 2019 reached 2.73 million hectares, and thus the area for rehabilitation with rotation until 2030 is only 0.05 million hectares. To meet the plantation expansion (i.e., 4.07 million hectares), the area of rehabilitation with rotation of about 4.12 million hectares is needed. Most of the fulfillments are outside the forest area (APL) in the form of unproductive land (non-forest cover) and are included in the area allocated for the development of community forests.

The area of non-rotational rehabilitation required until 2030 to achieve the net sink target is 2.51 million hectares. With the development of the implementation until 2019, it only reached 0.62 million hectares. Therefore, the required land area is 1.89 million hectares. From the analysis, the locations for the implementation of this activity are in areas with IPL 6-9 and are spread over forest functions, especially in production and conservation forests. The largest areas are in Central Kalimantan Province and Riau Province. Some of this area is in the mangrove ecosystem, which covers an area of about 90,000 hectares. Some of the swamp ecosystem areas near coastal (tidal swamps) are also potential to be developed into mangrove forests.

f. Peatland management

Peatland management, which includes water level management and restoration, is the key mitigation action that determines the success of the forest and land sector towards a net sink. Through Minister of Environment and Forestry Regulation No. 15 of 2017, PBPH and HGU permit owners who are indicated to be in a peat ecosystem to maintain the water level of peatlands in their area to not more than 40 cm, by improving the water system on peatlands. The mitigation action of maintaining the water level will result in reduced emissions compared to the baseline water level for commercial crop cultivation. The area that is expected to implement a good water management system until 2030 in order to achieve the net sink target is estimated to be 0.95 million hectares.

Restoration activities include efforts to rewet peatlands either through blocking or filling canals, followed by revegetation activities or planting of commodities that are adaptive to the natural characteristics of peatlands (paludiculture system). The successful implementation of restoration activities will be followed by a reduction in the risk of emissions from fires and peat decomposition. To achieve the sink set target, the area for peat restoration until 2030 should reach 2.72 million hectares. Until 2019, the progress of the implementation of restoration activities has only reached 0.835 million hectares (i.e., there are still around 1.887 million hectares that must be restored until 2030). The result of the analysis indicates that the potential area for carrying out restoration activities is spread over inside and outside forest areas and concessions.

g. Biodiversity Conservation

As part of the effort to reduce greenhouse gas emissions in the forestry and land sector, biodiversity conservation can be viewed from many perspectives, including conservation of wild plants and animals, habitat conservation and protection, and involving local communities. There are currently 38 million ha of high conservation value (HCVF) areas, of which 1.51 million ha are in high-risk areas and must be protected from conversion. More cases of animal deaths are found outside conservation areas. Therefore, the protection of HCVF outside the conservation area is very important to ensure protection of animals and ensure they do not leave the corridor.

Based on the spatial analysis, the distribution of locations for implementing mitigation actions to reduce greenhouse gas emissions can be seen in **Figure S4**.

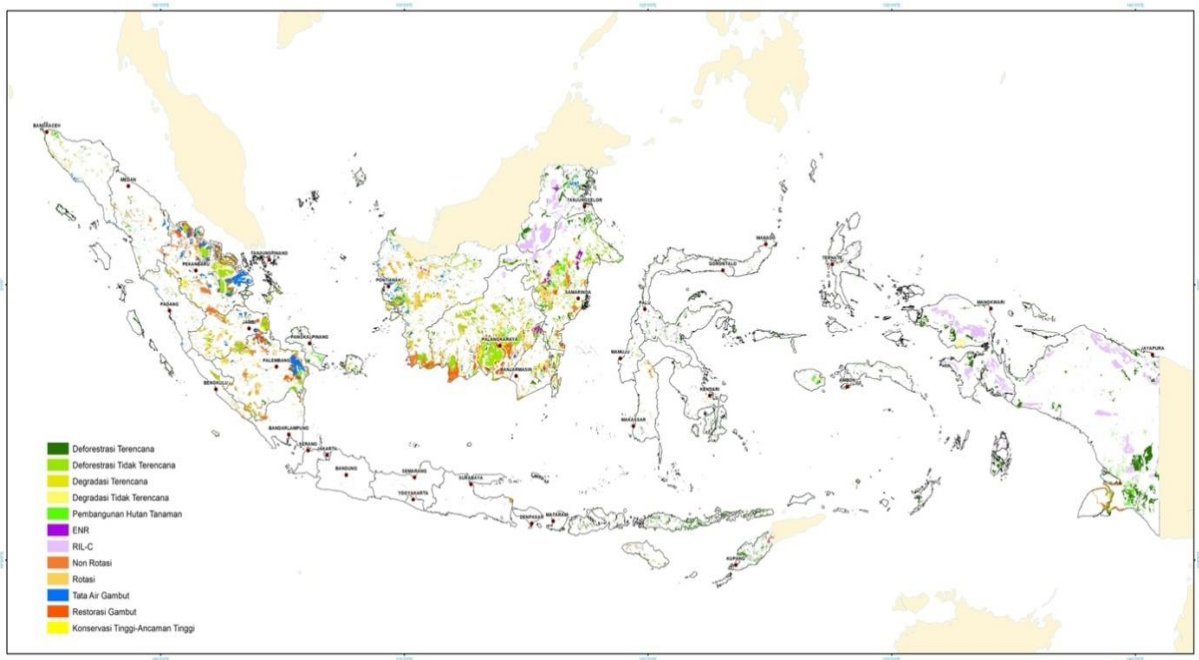

Figure S4. Spatial distribution of FOLU sector mitigation action locations to achieve Net Sink 2030

h. Law Enforcement

Following efforts on establishing appropriate policies and operation requires, law enforcement in order to have a continuesly and consistently implementation. Since 2016 the law enfrocement has strogly implemented mainly on forestfire cases, forest encroachment and illegal logging. Those are going be continuesly conducted.

Strategy for Achieving Net Sink

Forests and their ecosystems must be valued as nature-based solutions (NBS) in order to achieve the net sink target. The Ministry of Environment and Forestry has issued several important policies that can support the achievement of Indonesia's FOLU Net Sink 2030, including:

a. Forest Area Gazettement

Forest Area Gazettement is the main enabling condition for all business and non-business activities in forest areas. Accelerating the determination of forest area is a priority activity mandated by Law Number 11 of 2020 concerning Job Creation. With this mandate, the Government of Indonesia (i.e., the Ministry of Environment and Forestry) has the task of completing the determination of forest areas until 2023 at the latest.

b. Social Forestry

Based on the Minister of Environment and Forestry Regulation No.9 of 2021, the Ministry of Environment and Forestry issued a Social Forestry (PS) scheme that is aimed to legally allocate forests to communities and provide access to incentives and capacity-building programmes in order to optimise land productivity. Social forestry schemes (PS) can be implemented within PBPH areas as part of efforts

to resolve tenure conflicts and increase the utilisation of PBPH areas, namely in the form of forestry partnerships. In conservation forest areas, the PS programme can be carried out as a solution for resolving community land conflicts in the form of conservation partnerships. The social forestry scheme (also called *Jangka Benah)* is also a solution for revamping areas within forest areas that have already been used by the community for non-forestry activities, especially agriculture. The *Jangka Benah* is an effort to improve the function of forest areas by encouraging the community to adopt an agroforestry system instead of monoculture farming.

c. Multi-business of Forestry Scheme

Based on the Minister of Environment and Forestry Regulation No.8 of 2021, the Ministry of Environment and Forestry has established a multi-business scheme that allows forest concessions to have more than one business activity, besides the utilisation of timber forest products and non-timber forest products (NTFP) as well as other businesses based on environmental services.

d. Forestry Planning

Based on the Minister of Environment and Forestry Regulation No.7 of 2021, the Ministry of Environment and Forestry has allocated an area without forest cover for non-forestry development.

e. Termination of the New Business Licence Issuance on Primary Forest and Peatland through Presidential Instruction No. 5 of 2019 and SK 5446/2021

The Ministry of Environment and Forestry regulates the policy of suspending new permits and improving the governance of primary forests and peatlands. However, exceptions are acceptable for environmental services or the NTFPs. Of course, they should neither change the physical landscape and main function of the area nor damage the environment. In the context of accelerating peat restoration, the government will further regulate the granting of business permits for peat restoration.

f. Act No.26/2007 concerning Spatial Planning and Minister of Environment and Forestry Regulation No.29 of 2009 concerning Guidelines For Biodiversity Conservation In The Regions, and PP No.18 of 2021 concerning Concession Right, Land Right, Apartment Unit And Land Registration

PP No.18 of 2021 concerning concession right, land right, apartment unit, and land registration

The protection of the HCV areas outside the forest area can be done through the process of revising the spatial planning. The HCV area must be intended as a protection zone. The Ministry and Forestry Regulation No.29 of 2009 mandate the local governments to develop biodiversity profiles with APBD funding. Presidential Regulation No.18 of 2021 states that HCV with forest cover within HGU but outside forest areas should be managed, maintained, and monitored.

g. Development of the Environmental Fund Service Agency (BPDLH) as the implementation of the PP on Environmental Economic Instruments (PP 46/2017) and Presidential Regulation No. 77/2018 concerning Environmental Fund Management

This agency will manage funding from both domestic and international sources (including funds from REDD+ performance-based payments) to support various programmes and activities for environmental improvement and climate change management by local governments and other parties. BPDLH also develops an incentive system for development actors that contribute to reducing greenhouse gas emissions. To reduce greenhouse gas emissions, further policies on the Economic Value of Carbon through the Presidential Regulation are also being prepared specifically to support the achievement of the target.

h. Strengthening supervision and law enforcement for handling land and forest fires through Presidential Instruction 30/2020 concerning Prevention Of Forest And Land Fires.

The President of Indonesia has instructed all central government agencies and the government regions to carry out the monitoring and strengthening of law enforcement related to land and forest fires. The Ministry of Environment and Forestry has signed the joint declaration with the Chief of the Indonesian National Police (Mak/01/11/2020) regarding the strengthening of the law enforcement on forest and land fires.

Means of Implementation and International Partnership

Mitigation actions in the FOLU sector towards net sink by 2030 indicate the necessities of transformational changes, which require the implementation from domestic resources and international partnership.

a. Finance

As a result of the ambitious target in the FOLU sector, financing flows are needed to facilitate the achievement of emission reduction and sink enhancement targets while supporting economic growth, green recovery from COVID-19, and climate resilience, within the just principles of development.

Indonesia has made initial estimates on finance towards FOLU net sink 2030 based on the standard cost of mitigation activities in the NDC implementation roadmap. The estimates show that the total finance for the implementation of mitigation actions towards net sink until 2030 reaches up to 239 trillion IDR Forest protection activities from deforestation require 111 trillion IDR, with financial contributions from the private sector of about 34%, while the rest comes from the state budget and the public. Forest protection activities from degradation require funding of Rp 47 trillion, which comes from the private sector and needs to be compensated with results-based payment for environmental services. Enrichment activities require finance of 608 billion IDR, with the private sector contribution of 94%, while RIL activities require finance of 767 billion IDR—all of which came from the private sector.

Rehabilitation activities with rotation require total finance of 8 trillion IDR, with the private sector contribution of 47%. Non-rotational rehabilitation activities require finance of 4 trillion IDR, with the private sector contribution of 24%. The water management improvement activities have the potential for implementation that far exceeds the LTS target, with total private sector financing of 301 billion IDR. Peatland restoration activities require total finance of 12 trillion IDR, with the private sector contribution of 16%.

Currently, most of the finance for mitigation actions is still borne by APBN finance sources (state budget), which is vastly insufficient.

Indonesia has taken a number of policies that open opportunities to increase the diversification of financial sources from national and international—public and private sources. Furthermore, Indonesia continues to mobilise international financial sources through bilateral, regional, and multilateral channels, including result-based payment for REDD+ under the Paris Agreement, grants, and other potential sources and mechanisms.

b. Capacity Development, Research, and Technology Cooperation

Indonesia has a long history of collaboration for capacity development in the forestry sector. There have been increasing trends in forest and climate-related capacity development programme for the past 20 years, not only as a stand-alone programme but also as part of a broader scope of cooperation.

International support for capacity development under the Paris Agreement (UNFCCC) as well as forest-related Conventions will continue to be mobilised to support the achievement of the FOLU net sink 2030.

Research will play a key role in supporting the implementation of the FOLU net sink 2030. Indonesia will strengthen research collaboration among institutions within the country and national institutions with international partners.

In terms of technology development, Indonesia will strengthen the role of endogenous technology while simultaneously seeking the opportunity for technology cooperation under the framework of the Paris Agreement and Convention.

Monitoring and Reporting

Monitoring and supervision activities on the implementation of FOLU sector mitigation actions towards the 2030 net sink, in accordance with PP23/2021 on Forestry Implementation, need to be carried out by strengthening the National Forest Monitoring System (NFMS). Monitoring of mitigation actions in the FOLU sector will be strengthened by Norms, Standards, Procedures and Indicators (NSPK) for controlling, monitoring, evaluating, and reporting on the implementation of mitigation actions for emission reduction from the land and forestry sector (FOLU). It is also part of the MoEF's Geospatial Information Network (JIG) and integrated with the National JIG. This activity includes institutional monitoring in reporting plans and implementation of emission reduction activities and their achievements on a regular basis.

PREFACE

Indonesia has ratified the Paris Agreement, through Act number 16 of 2016, including by committing to progressive actions to achieve the global goal of limiting the increase in the global average temperature to below 2°C from pre-industrial levels and continuing to strive to limit the increase in temperature to below 1.5°C. This commitment is stated in the Nationally Determined Contribution (NDC) document, which contains a commitment to a GHG emission reduction target of 29% (CM1) and up to 41% (CM2) compared to business as usual (BAU) in 2030.

The government had prepared an NDC Implementation Strategy in 2017, followed by an NDC Mitigation Road Map in 2019. In 2021, the Indonesian government submitted an NDC update and developed a long-term strategy for low-carbon and climate-resilient development (Long Term Strategy Low Carbon and Climate Resilience 2050; LTS-LCCR 2050) which has been submitted to the UNFCCC Secretariat in July 2021, before UNFCCC COP 26 in Glasgow November 2021.

Indonesia's NDC is summarised in the following sectors: Energy, Agriculture, FOLU (Forest and other Land Uses), IPPU (industrial process and production use), and waste. In Indonesia's NDC record, the Forest and Other Land Use (FOLU) sector is projected to contribute nearly 60% of the total target for reducing greenhouse gas emissions. Therefore, the handling of GHG control in the forestry sector is very important for Indonesia and in the global climate actions agenda.

In the LTS-LCCR 2050 document, Indonesia emphasised the initiative to make the FOLU sector a net sink by 2030. This initiative was built from corrections to policies and steps in the forestry sector over a period of no less than seven years, as well as in-depth observations on various forest sector issues that have been ongoing for more than a decade. Several aspects were explored, such as forest and land fires, moratorium on new permits on primary forest and peat, weather modification techniques, increasing forest and land rehabilitation efforts; and law enforcement, the enforcement of law on forest encroachment and illegal logging, with the resultant steps being reflected in a significant reduction in deforestation in 2021. Of course, it is well understood that the implementation of the FOLU Net Sink 2030 scenario will require enormous resources and support from various parties, comprising of; Ministries/Agencies, local governments, the business world, community, including international support.

The Operational Plan for Indonesia's FOLU Net Sink 2030 is prepared using a spatial analysis approach, such as; Forest Quality Index, High Conservation Value (HCV), High Environmental Services, and Carbon Sequestration Biogeophysical Index (IBGF), as well as forest and land fires. In addition, consideration is also given to the direction for utilisation of forest areas/RKTN 2011–2030 as well as institutional capacity and social capital at the site level. Of course, it is difficult to build and formulate the ambition of a net zero emission forestry sector (FOLU) by 2030, especially from an operational standpoint.

All action steps in this Operational Plan are designed in detail and integrated to generate multiple benefits in the form of measurable reductions in emission rates, improvement and increase in forest and land canopy cover, improvement of various main functions of forests such as water management, microclimate, ecosystems, and biodiversity conservation. It also includes contributions to welfare, equality and public health, upholding the law. In principle, restoring the national natural forest and its function as a support for life as a whole.

As part of an initiative to reduce greenhouse gas emissions, this document is a working guide for the climate change agenda and climate actions for the forestry and land sectors in Indonesia. The achievement

of reducing carbon emissions according to the FOLU Net Sink 2030 target will contribute significantly to Indonesia's NDC targets by 2030, and accelerate the fulfilment of targets by the energy sector and other sectors in the national scenario in line with the LTS-LCCR context towards the 2060 commitment or earlier.

This document is dynamic in nature, to the extent that efforts are necessary to collect and organise it on a continuous basis. As a dynamic document, various inputs for adjustments will be highly valued and can be taken into account to enhance the operational functioning of the FOLU Net Sink 2030.

The implementation of FOLU Net Sink 2030 will affirm Indonesia's position and dignity as a party to the UNFCCC and fulfil Indonesia's commitments to the Paris Agreement and Act Number 16 of 2016. Therefore, in our efforts to protect our birthplace (Indonesia) and everything within it, it takes determination, careful implementation, perseverance, and patience to continuously make improvements over time in order to achieve the utmost success.

Jakarta, Februari 2022

MENTERI LINGKUNGAN HIDUP DAN KEHUTANAN

Dr. Ir. Siti Nurbaya Bakar, M.Sc.

ABBREVIATION

1. AMDAL : *Analisis Mengenai Dampak Lingkungan* (Environmental Impact Assessment)
2. APL : *Area Penggunaan Lain* (Other Land Uses)
3. ATR/BPN : *Agraria dan Tata Ruang/Badan Pertanahan Nasional* (Agrarian Affairs and Spatial Planning/National Land Agency)
4. Bang Pesona : *Bantuan Pengembangan Perhutanan Sosial Nusantara* (Social Forestry Development Management Prgramme)
5. BAU : Business as usual
6. BioCF-ISFL : The BioCarbon Fund Initiative for Sustainable Forest Landscapes
7. BKT : *Bernilai Konservasi Tinggi* (High Conservation Value - HCV)
8. BPDLH : *Badan Pengelola Dana Lingkungan Hidup* (Environmental Fund Management Agency)
9. BRGM : *Badan Restorasi Gambut dan Mangrove* (Peat and Mangrove Restoration Agency)
10. CPOS : Current Policy Scenario
11. CM 1 : Counter Measures 1 (unconditional NDC scenario)
12. CM 2 : Counter Measures 2 (conditional NDC scenario)
13. COP : Conference of Parties
14. CSR : Corporate Social Responsibility
15. DAS : *Daerah Aliran Sungai* (Watershed)
16. DBH DR : *Dana Bagi Hasil Dana Reboisasi* (Revenue Sharing Funds for Reforestation Funds)
17. DD : *Deforestasi Degradasi* (Deforestation and Degradation)
18. DDDT : *Daya Dukung dan Daya Tampung* (Carrying Capacity and Environmental Capacity)
19. DMPG : *Desa Mandiri Peduli Gambut* (Independent Village Cares for Peatland)
20. ENR : Enhanced Natural Regeneration
21. FCPF : Forest Carbon Partnership Facility
22. FOLU : Forestry and Other Land Use
23. GCF : Green Climate Fund
24. GRK : *Gas Rumah Kaca* (Greenhouse Gas)
25. HCV : High Conservation Value
26. HD : *Hutan Desa* (Village Forest)
27. HGU : *Hak Guna* Usaha (Cultivation Right)
28. HHBK : *Hasil Hutan Bukan Kayu* (Non-Timber Forest Product)
29. HKm : *Hutan Kemasyarakatan* (Community Forest)
30. HL : *Hutan Lindung* (Protection Forest)
31. HP : *Hutan Produksi* (Production Forest)
32. HPK : *Hutan Produksi Konversi* (Convertible Production Forest)
33. HPT : *Hutan ProduksiTerbatas* (Limited Production Forest)
34. HPH : *Hak Pengusahaan Hutan* (Forest Concession Rights)
35. HTI : *Hutan Tanaman Industri* (Industrial Forest)
36. HTR : *Hutan Tanaman Rakyat* (Community Forest Plantation)
37. HR : *Hutan Rakyat* (Community Forest)
38. IBGF : *Indek Biogeofisik* (Biogeophysical Index)
39. IJLH : *Indek Jasa Lingkungan Ekosistem* (Ecosystem Services Index)
40. IJLT : *Indek Jasa Lingkungan Tinggi* (High Environmental Services Index)

41. IKH : *Indek Kualitas Hutan* (Forest Quality Index)
42. IPL : *Indek Prioritas Lokasi* (Location Priority Index)
43. ISPO : Indonesian Sustainable Palm Oil
44. ITNP : *Indeks Tutupan non-Produktif* (Non-productive Cover Index)
45. Karhutla : *Kebakaran Hutan dan Lahan* (Forest and Land Fires)
46. KBR : *Kebun Bibit Rakyat* (People's Nursery)
47. KHG : *Kesatuan Hidrologi Gambut* (Peat Hydrology Unit)
48. KLHK : *Kementerian Lingkungan Hidup dan Kehutanan* (Ministry of Environemnt and Forestry)
49. KLHS : *Kajian Lingkungan Hidup Strategis* (Strategic Environmental Studies)
50. KPH : *Kesatuan Pengelolaan Hutan* (Forest Management Unit - FMU)
51. KPHL : *Kesatuan Pengelolaan Hutan Protection* (Protection Forest Management Unit)
52. KPHP : *Kesatuan Pengelolaan Hutan Production* (Production Forest Management Unit)
53. KPHK : *Kesatuan Pengelolaan Hutan Konservasi* (Conservation Forest Management Unit)
54. KTH : *Kelompok Tani Hutan* (Community Farmers Group)
55. LCCP : Low Carbon Compatible with Paris Agreement
56. LTS-LCCR : Long -term Strategy on Low Carbon and Climate Resilience
57. MPTS : Multi-Purpose Tree Species
58. NDC : Nationally Determined Contribution
59. NEK : *Nilai Ekonomi Karbon* (Carbon Economic Value)
60. NPS : Non-Party Stakeholders
61. NZE : Net Zero Emission
62. PAD : *Pendapatan Asli Daerah* (Regional Revenue)
63. PBPH : *Perizinan Berusaha Pemanfaatan Hutan* (Forest Utilisation Business Licence)
64. PBPH-HA : *Perizinan Berusaha Pemanfaatan Hutan-Hutan Alam* (Forest Utilisation Business Licence -Natural Forest)
65. PBPH-HT : *Perizinan Berusaha Pemanfaatan Hutan-Hutan Tanaman* (Forest Utilisation Business Licence-Plantation Forest)
66. PBPH-RE : *Perizinan Berusaha Pemanfaatan Hutan-Restorasi Ecosystem* (Forest Utilisation Business Licence-Ecosystem Restoration)
67. PCK : *Peningkatan Cadangan Karbon* (Carbon Stock Increase)
68. PDASRH : *Pengelolaan Daerah Aliran Sungai dan Rehabilitasi Hutan* (Watershed Management and Forest Rehabilitation)
69. PEMDA : *Pemerintah Daerah* (Local Government)
70. PEN : *Pemulihan Ekonomi Nasional* (National Economy Recovery)
71. PES : Payment for Ecosystem Services
72. PHL : *Pengelolaan Hutan Lestari* (Sustainable Forest Management)
73. PHLHK : *Penegakan Hukum Lingkungan Hidup dan Kehutanan* (Law Enforcement on Environmet and Forestry)
74. PIAPS : *Peta Indikatif dan Area Perhutanan Sosial* (Indicative Map of Social Forestry Area)
75. PIPPIB : *Peta Indikatif Penundaan Pemberian Izin Baru* (Indicative Map of New Permit Moratorium)
76. PKTL : *Planologi Kehutanan dan Tata Lingkungan* (Forestry Planning and Environmental Governance)
77. PPI : *Pengendalian Perubahan Iklim* (Climate Change)
78. PPKL : *Pengendalian Pencemaran dan Kerusakan Lingkungan* (Environmental Pollution and Degradation Control)

79. PROKLIM : *Program Kampung Iklim* (Climate Village Program)
80. PROPER : *Program Penilaian Peringkat Kinerja Perusahaan*
81. PSKL : *Perhutanan Sosial dan Kemitraan Lingkungan* (Social Forestry and Environmental Partnership)
82. RBP : Result-Based Payment
83. RE : *Restorasi Ekosistem* (Ecosystem Restoration)
84. REDD : Reducing Emissions from Deforestation and Forest Degradation
85. RIL : Reduce Impact Logging
86. RKPS : *Rencana Kerja Perhutanan Sosial* (Social Forestry Work Plan)
87. RKTN : *Rencana Kehutanan Tingkat Nasional* (National Forestry Plan)
88. RKU : *Rencana Kerja Usaha* (Business Work Plan)
89. RPHJP : *Rencana Pengelolaan Hutan Jangka Panjang* (Long-term Forest Management Plan)
90. RPPEG : *Rencana Pengelolaan Ekosistem Gambut Nasional* (National Peat Ecosystem management Plan)
91. RSPO : Roundtable Sustainable Palm Oil
92. RTRW : *Rencana Tata Ruang Wilayah* (Regional Spatial Plan)
93. SDH : *Sumber Daya Hutan* (Forest Resources)
94. SILIN : *Silvikultur Intensif* (Intensive Silviculture)
95. SRN : *Sistem Registri Nasional* (National Registry System)
96. TAPE : *Transfer Anggaran Province berbasis Ekologi* (Ecologically-based Budget Province Transfer)
97. TAKE : *Transfer Anggaran Kabupaten berbasis Ekologi* (Ecologically-based Budget District Transfer)
98. TPTI : *Tebang Pilih Tanam Indonesi*a (Indonesian Silviculture Selective Logging System)
99. TPTJ : *Tebang Pilih Tanam Jalur* (Selective Logging With Line Planting)
100. TR : *Tebang Rumpang* (Gap Simulation System)
101. TRNS : Transition scenario
102. UNFCCC : United Nation Framework Convention on Climate Change
103. UUCK : *Undang-Undang* Cipta Kerja (Act on Job Creation)

GLOSSARY

1. Agroforestry	:	Integrated forest management, combining the cultivation of timber witl agricultural crops.
2. Cross cutting	:	Significant issues or factors that may influence other aspects o subsectors/sectors in their entirety.
3. Deforestation	:	Changes in forest cover from natural forest to non-natural forest.
4. Degradation	:	Changes in forest cover from primary forest to secondary forest.
5. Green jobs	:	Refers to a type of work that is respectful of the environment or based on sustainability programme.
6. Green sukuk or Green bonds	:	A funding instrument prioritising green projects and Shari'a-based sukuk.
7. Irreversible drying	:	The transformation into a dry state and inability to fuly return to its intial stat due to losing the water retention (hydrophilic) property and becomes wate repellent (hydrophobic).
8. Conservation	:	Protection and preservation of natural forest and biodiversity.
9. Locked-in emission	:	Future emissions of carbon dioxide that are caused by decisions made today One such activity is the extraction of resources that damage hard-to-restor carbon storage ecosystems so that they are not recoverable..
10. Net zero emission	:	The condition that describes the value of greenhouse gas emissions i equivalent to the level of uptake, so the net emissions are zero.
11. Net Sink	:	Conditions that describe the absorption of GHGs from the atmosphere and tha are greater than the resultant emissions. In that state, vegetation and carbo storage ecosystems play an important role in GHG absorption.
12. Paludiculture	:	Commodities that are adaptive to the natural characteristics of peatlands.
13. PIAPS	:	An instrument prepared to provide guidance in forested areas that may b managed by the community within the framework of the social forestr regimescheme.
14. Planned deforestation	:	Proposed transformation of natural forest into non-natural forest for lega purposes.
15. Rehabilitation	:	Activities aimed at restoring, maintaining and enhancing forestry and lan functions.
16. Restoration	:	Efforts to restore or even imrove the essential functions of a degrade ecosystem, as before.
17. Revegetation	:	Reforestation activities of degraded land with low surface biomass.
18. Rewetting	:	Rewetting of peatlands that have been degraded due to drying.
19. Unplanned deforestation	:	Planned change of natural forest to non-natural forest due to illegal purposes.
20. PBPH	:	Business licence granted to business actors to start and run businesses and/o forest utilisation activities

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CHAPTER I
INTRODUCTION

1.1. Background

The 2015 meeting of the Parties to the Convention on Climate Change in Paris (Conference of Parties, COP 21 UNFCCC) agreed on the Paris Agreement, with the objectives stated in Article 2 paragraph (a) restraining the increase in global temperature from the pre-industrialisation era temperature level below 2°C and continuing efforts to limit the temperature rise to 1.5°C. For this matter, Indonesia has ratified the Paris Agreement through Act Number 16 of 2016 concerning the Ratification of the Paris Agreement to the United Nations Framework Convention on Climate Change (UNFCCC).

As the Indonesia National Focal Point for UNFCCC, the Ministry of Environment and Forestry (MoEF) is tasked with bridging issues at the international level with national interests and policies. Accordingly, the MoEF has coordinated the preparation of the NDC Implementation Strategy document, the NDC Mitigation Road Map, LTS-LCCR 2050, as well as various laws and regulations related to climate change control.

In 2021, Presidential Regulation Number 98 of 2021 concerning Implementation of Carbon Economic Values for Achieving Nationally Determined Contribution Targets and Control of Greenhouse Gas Emissions in National Development has been stipulated. Article 3 paragraph (4) states that the reduction of GHG emissions as referred to in paragraphs (2) and (3) is mainly supported by controlling GHG emissions in the forestry sector to become carbon storage, or strengthening with a carbon net sink approach from the forestry sector and other land uses by 2030 (Indonesia's Forest and Other Land Use Net Sink 2030).

Since 2016, corrective steps have been built and implemented until 2021 in the form of policies, implementation of activities, development of work systems, and monitoring measures as well as reviewing the results and impacts. The policy and implementation of the forestry sector will continue to be strengthened and improved in line with the development of challenges in the forestry sector and the impact of climate change. Some of the policies and implementations that have clearly experienced changes and progress include:

First, the change in the direction of production forest management, which initially focused on timber management to forest resource ecosystems and community management (forest landscape management);

Second, affirmation of licensing control with a moratorium on permits in primary forest and peat (PIPPIB) since 2011, which is renewed every two years and has become a permanent policy of Indicative Map of Termination of New Permits (PIPPIB) since 2019;

Third, the actualisation of the application of the principles of carrying capacity and carrying capacity of the environment in planning and implementing the utilisation and use of forest areas, and the internalisation of the principles of carrying capacity and carrying capacity of the environment into the preparation of the revised National Forestry Plan (RKTN) as a spatial macro direction for forestry development in 2011–2030, and their applications in relevant development activities;

Fourth, alignment of the MoEF's policy direction in accordance with sustainable development goals, SDGs, Paris Agreement on Climate Change, Aichi Biodiversity Targets, Land Degradation Control, and various international conventions that have been established and represents the commitments of the Government;

Fifth, development of climate resilience through restoration and management of peatlands, forest rehabilitation and deforestation control, in climate adaptation and mitigation actions;

Sixth, management and control of forest and land fires, oriented towards permanently prevent forest fires and significantly reducing forest and land fires in 2015 - 2018 and 2019 - 2021;

Seventh, controlling the rate of deforestation, which fluctuates from year to year but continues to decline, of which the 2019–2021 period recorded a significant decrease in the rate of deforestation of forests and land;

Eighth, prevention of biodiversity loss through area conservation efforts and protection of biodiversity inside and outside protected areas, through habitat fragmentation management and species enrichment;

Ninth, management of community access to forest management in the form of social forestry with the principles of forest protection, rehabilitation, reforestation and community empowerment through agroforestry, agrosilvopasture, and agrosilvofishery systems;

Tenth, organization of concessions and activities in forest areas on the principle of multiple forestry businesses, developmet of forestry business diversification, integration of land use, timber and non-timber forest products, and environmental services;

Eleventh, affirmation of the policy on the obligation to restore forest ecosystems and enrich forest with hardwood plants through a silvicultural system and Reduced Impact Logging (RIL) as well as encourage the harmony of cooperation and development of the business world to local community groups in one managed forest area;

Twelveth, the introduction of the use of environmental services in the forestry multi-business model, as part of climate change mitigation actions in the land-based forestry sector. Contribution of business licence holders in climate change mitigation efforts can be done through activities that can reduce emissions and increase carbon sequestration and/or conservation of carbon stocks, including maintaining dense natural vegetative cover to mangrove planting or reforestation;

Thirteenth, the introduction of area planning, especially in open areas (outcrop) and riverbanks (ecoriparian) by reforestation and through the development of ecosystem replication;

Fourteenth, affirming national development policies and implementation by emphasising the principle of balance between development (economic) and the environment. Economic development is also intended in the context of economic recovery (national), which can create new job opportunities for the community;

Fifteenth, affirmation of government policies that favour the community in the allocation of forest use, area planning and area disputes, and policies that guarantee rights for the people and provide a way to resolve customary forest problems for indigenous peoples;

Sixteeth, resolving tenure conflict issues by providing a way out through Act No. 11 of 2020, to resolve (related) cross-sectoral regulatory disputes and emphasise the actualisation of justice for the community on land access with a restorative justice approach;

Seventeenth, law-enforcement steps, through the strata of guidance and supervision of the application of standards and enforcement with legal sanctions in the context of forest area protection and justice for the community;

Eighteenth, the steps towards strengthening of quality and integrated spatial data and information on forest resources as materials in the systematic, continuous and consistent decision-making process;

With the stabilisation of policies and measures as well as the implementation and evaluation of the alleged forestry sector, the Government of the Republic of Indonesia has established policies in the context of reducing Greenhouse Gas Emissions to control climate change, with the National programme of "**Indonesia's FOLU Net Sink 2030**" as stipulated in the Presidential Regulation No. 98 of 2021, which will be able to achieve net-zero emissions in the forestry and land sector by 2030.

1.2. Legal Basis

1. Act Number 5 of 1990 concerning Conservation of Biological Natural Resources and Their Ecosystems (State Gazette of the Republic of Indonesia Number 49 of 1990, Supplement to the State Gazette of the Republic of Indonesia Number 3687);
2. Act Number 41 of 1999 concerning Forestry ((State Gazette of the Republic of Indonesia of 1999 Number 167, Supplement to the State Gazette of the Republic of Indonesia Number 3888) as amended several times, the most recent by Act Number 11 of 2020 concerning Job Creation (State Gazette of the Republic of Indonesia Number 245 of 2020, Supplement to the State Gazette of the republic of Indonesia Number 6573);
3. Act Number 26 of 2007 concerning Spatial Planning (State Gazette of the Republic of Indonesia Number 68 of 2007, Supplement to the State Gazette of the Republic of Indonesia Number 4725 as amended by Act Number 11 of 2020 concerning Job Creation (State Gazette of the Republic of Indonesia Number 245 of 2020, Supplement to the State Gazette of the Republic of Indonesia Number 6573);
4. Act Number 32 of 2009 concerning Environmental Protection and Management (State Gazette of the Republic of Indonesia Number 140 of 2009, Supplement to the State Gazette of the Republic of Indonesia Number 5059) as amended by Act Number 11 of 2020 concerning Job Creation (State Gazette of the Republic of Indonesia Number 245 of 2020, Supplement to the State Gazette of the Republic of Indonesia Number 6573);
5. Act Number 18 of 2013 concerning Prevention and Eradication of Forest Destruction (State Gazette of the Republic of Indonesia Number 130 of 2013, Supplement to the State Gazette of the Republic of Indonesia Number 5432) as amended by Act Number 11 of 2020 concerning Job Creation (State Gazette of the Republic of Indonesia Number 245 of 2020, Supplement to the State Gazette of the Republic of Indonesia Number 6573);
6. Act Number 23 of 2014 concerning Regional Government (State Gazette of the Republic of Indonesia Number 244 of 2014, Supplement to the State Gazette of the Republic of Indonesia Number 5587) as amended several times, most recently by Act Number 11 of 2020 concerning Job Creation (State Gazette of the Republic of Indonesia Number 245 of 2020, Supplement to the State Gazette of the Republic of Indonesia Number 6573);
7. Act Number 16 of 2016 concerning Ratification of the Paris Agreement To The United Nations Framework Convention on Climate Change;

8. Act Number 11 of 2020 concerning Job Creation (State Gazette of the Republic of Indonesia Number 245 of 2020, Supplement to the State Gazette of the Republic of Indonesia Number 6573);
9. Government Regulation Number 28 of 2011 concerning Management of Nature Reserves and Nature Conservation Areas (State Gazette of the Republic of Indonesia of 2011 Number 56, Supplement to the State Gazette of the Republic of Indonesia Number 5217) as amended by Government Regulation Number 108 of 2015 concerning Amendments to Government Regulation Number 28 of 2011 concerning Management of Nature Reserves and Nature Conservation Areas (State Gazette of the Republic of Indonesia of 2015 Number 330);
10. Government Regulation Number 71 of 2014 concerning Protection and Management of Peat Ecosystems (State Gazette of the Republic of Indonesia of 2014 Number 209, Supplement to the State Gazette 5580) as amended by Government Regulation Number 57 of 2016 concerning Amendments to Government Regulation Number 71 of 2014 concerning Protection and Management of the Peat Ecosystem (State Gazette of the Republic of Indonesia Year 2016 Number 260, Supplement to the State Gazette 5957);
11. Government Regulation Number 26 of 2020 concerning Forest Rehabilitation and Reclamation (State Gazette of the Republic of Indonesia Number 137 of 2020, Supplement to the State Gazette of the Republic of Indonesia Number 6518) as the basis for implementing forest and land rehabilitation activities;
12. Government Regulation Number 5 of 2021 Implementation of Risk-Based Business Licensing (State Gazette of the Republic of Indonesia Number 15 of 2021, Supplement to the State Gazette of the Republic of Indonesia Number 6573);
13. Government Regulation Number 22 of 2021 concerning the Implementation of Environmental Protection and Management (State Gazette of the Republic of Indonesia Number 32 of 2020, Supplement to the State Gazette of the Republic of Indonesia Number 6634);
14. Government Regulation Number 23 of 2021 concerning the Implementation of Forestry (State Gazette of the Republic of Indonesia Number 33 of 2020, Supplement to the State Gazette of the Republic of Indonesia Number 6635);
15. Government Regulation Number 24 of 2021 concerning Procedures for Imposing Administrative Sanctions and Procedures for Non-Tax State Revenue Originating from Administrative Fines in the Forestry Sector (State Gazette of the Republic of Indonesia Number 15 of 2021, Supplement to the State Gazette of the Republic of Indonesia Number 6573);
16. Presidential Regulation Number 68 of 2019 concerning the Organization of State Ministries as amended by Presidential Regulation Number 32 of 2021 concerning Amendments to Presidential Regulation Number 68 of 2019 concerning Organization of State Ministries (State Gazette of the Republic of Indonesia Number 106 of 2021, Supplement to the State Gazette of the Republic of Indonesia Number 6573);
17. Presidential Regulation Number 92 of 2020 concerning the Ministry of Environment and Forestry (State Gazette of the Republic of Indonesia Number 209 of 2020);
18. Presidential Regulation Number 98 of 2021 concerning Implementation of Carbon Economic Value for Achieving Nationally Determined Contribution Targets and

Control of Greenhouse Gas Emissions in National Development (State Gazette of the Republic of Indonesia Number 249 of 2021);

19. Regulation of the Minister of Environment and Forestry Number 16 of 2017 concerning Technical Guidelines for the Restoration of Peat Ecosystem Functions (State Gazette of the Republic of Indonesia of 2017 Number 338);
20. Regulation of the Minister of Environment and Forestry Number 7 of 2021 concerning Forestry Planning, Changes in the Designation of Forest Areas and Changes in the Functions of Forest Areas, as well as the Use of Forest Areas (State Gazette of the Republic of Indonesia Number 322 of 2021);
21. Regulation of the Minister of Environment and Forestry Number 8 of 2021 concerning Forest Management and Preparation of Forest Management Plans, as well as Forest Utilisation in Protection Forests and Production Forests (State Gazette of the Republic of Indonesia Number 319 of 2021);
22. Regulation of the Minister of Environment and Forestry Number 9 of 2021 concerning Social Forestry Management (State Gazette of the Republic of Indonesia Number 320 of 2021);
23. Regulation of the Minister of Environment and Forestry Number 15 of 2021 concerning Organization and Work Procedures of the MoEF (State Gazette of the Republic of Indonesia Number 756 of 2021);
24. Regulation of the Minister of Environment and Forestry Number 24 of 2021 concerning Procedures for Organizing Thematic Geospatial Information within the Scope of the Ministry of Environment and Forestry (State Gazette of the Republic of Indonesia Number 1387 of 2021).

1.3. Objective and Target

The objectives of preparing Indonesia's FOLU Net Sink 2030 Operational Plan include :

1. Strengthening policies and work implementation to achieve Indonesia's FOLU Net Sink 2030 with systematic and measurable steps;
2. Establishing an operational action plan for reducing greenhouse gas emissions in the forestry and land sectors towards Indonesia's FOLU Net Sink 2030;
3. Elaborating the NDC targets into detailed action plans for reducing greenhouse gas emissions in the forestry and land sector using Indonesia's FOLU Net Sink 2030 approach;
4. Affirming the main supporting activities for the implementation of programmes and activities to reduce greenhouse gas emissions in the forestry and land sector towards Indonesia's FOLU Net Sink 2030 as well as the stages of work and operation and evaluation;
5. Acting as the main priority in the preparation of the Manual of Operation of each policy and the main supporting steps for the National Programme “Indonesia's FOLU Net Sink 2030”

As part of Indonesia's FOLU Net Sink 2030 Operational Plan, the country aims to achieve a greenhouse gas emission level of -140 million tonnes CO2e by 2030, support net-zero emissions in the forestry sector, and to fulfil the NDC which is the nation-

specific commitments in support of the global climate change agenda, taking into account Indonesia's more ambitious vision in the LTS-LCCR document.

1.4. Definision and Scope

1.4.1. Definition

1. Operational Plan is a planning document which addresses specific issues and provides information on how efforts should be made to achieve the stated objectives taking into account the availability and potential of resources.
2. Nationally Determined Contribution (NDC) is a national commitment to managing global climate change in order to achieve the goals of the Paris Agreement to the United Nations Framework Convention on Climate Change. The NDC describes the increased measures and favourable conditions over the 2015-2019 period that will form the basis for setting more ambitious targets beyond 2020. This will contribute to efforts to prevent a global temperature increase of 2°C and to continue efforts to limit the global temperature increase of 1.5°C from the pre-industrial period. The Nationally Determined Contribution, hereinafter abbreviated as NDC.
3. LTS-LCCR is a document that conveys the Indonesia's vision in a more ambitious scenario (Low Carbon Scenario Compatible with Paris Agreement target; LCCP) that Indonesia will increase its GHG emission reduction ambitions with a national peak of net GHG emissions (all sectors) of 1,244 million tonnes of CO2e or the equivalent of 4.23 tonnes of CO2e per capita to be achieved by 2030. Thereafter, the net emissions value will continue to decline and reach a net emissions level of 540 million tonnes of CO2e or equivalent to 1.6 tonnes of CO2e per capita by 2050, and continue to explore possibilities for faster progress towards the Net Zero Emission (NZE) target in 2060 or earlier.
4. FOLU or Forestry and Other Land Use is a sector category which is one of the sources of GHG emissions and sinks originating from the dynamics of changes in land cover and land use, which is expected to provide the largest contribution to achieving the target of reducing greenhouse gas emissions in Indonesia, as stated in NDC document.
5. Net zero emissions is a condition that describes the GHG emission value equivalent to the absorption rate, resulting in net zero emissions.
6. Net Sink is a condition that describes the GHG absorption in the atmosphere that is greater than the resulting emission, where in this condition, vegetation and carbon storage ecosystems play an important role in absorbing GHGs.
7. FOLU Net Sink 2030 is a requirement to be fulfilled through mitigation measures to reduce greenhouse gas emissions from the forest and land sector under conditions where the absorption rate already exceeds the emission level in 2030, in the target, the net-sink figure is projected to be 140 million tonnes of CO2e or negative emissions of 140 million tonnes of CO2e.

1.4.2. Scope

Indonesia's FOLU Net Sink Operational Plan 2030 is a documented plan outlining targets, policy and work steps for reducing greenhouse gas emissions by 2030 as stated in LTS-

LCCR 2050 and NDC 2030. RENOP taking into account various environmental and forestry sector instruments, such as the National Forestry Plan (RKTN) 2011–2030 and the Environmental Protection and Management Plan (RPPLH).

Indonesia's FOLU Net Sink 2030 Operational Plan provides an explanation for;

1) targets, strategies, and achievements; (2) implementation and operation, and (3) monitoring and evaluation of mitigation actions in the forest and land sector by engaging in the following activities:

a. Reduction in deforestation rate of mineral lands

   Efforts to prevent planned and unplanned deforestation on mineral land.

b. Reduction in deforestation rate of peatlands and mangrove

   Efforts to prevent planned and unplanned deforestation on peatlands and mangrove.

c. Reducing the rate of degradation of mineral lands

   Efforts to prevent planned and unplanned degradation in mineral land

d. Reducing the rate of degradation of peatlands and mangrove

   Efforts to prevent planned and unplanned degradation of peatlands and mangrove.

e. Plantation forest development

   Efforts to develop plantation forests in the context of increasing carbon stocks and reducing the pressure on natural forests to meet the demand for timber and its byproducts.

f. Sustainable forest management

   Efforts to reduce greenhouse gas emissions using RIL (Reduce Impact Logging-Carbon, RIL-C) technology and efforts to increase carbon stocks through enrichment (Enhanced Natural Regeneration, ENR).

g. Rotational rehabilitation

   Efforts to increase carbon stocks through forest and land restoration to restore productive functions.

h. Non-rotational rehabilitation

   Efforts to increase carbon stocks through forest and land rehabilitation in water management functions and other environmental services.

i. Peat restoration and improvement of peat water management

   Efforts to reduce greenhouse gas emissions through a series of activities include rewetting and revegetation activities, which concentrates primarily on deep peatlands that are currently used for agricultural activities as well as on non-productive land. Included are the efforts to reduce greenhouse gas emissions through improved peat water management in plantation areas (HGU) and industrial plantation forest (PBPH).

j. Mangrove rehabilitation and afforestation on ex-mining lands

   Efforts to increase carbon stocks through mangrove rehabilitation and afforestation on open area particularly ex-mines.

k. Conservation of biodiversity

Efforts to prevent the occurrence of greenhouse gas emissions from protected areas through protection, preservation, and sustainable use of biodiversity, including their habitats. In this case, the prevention of deforestation for the protection of natural forests contributes to efforts to maintain biodiversity, including through fragmented areas/habitat planning, and also the determination of the obligation to maintain the area with High Conservation Value (HCV) as well as the obligation to implement wildlife corridors in building construction as well as conservation partnership activities with local/local communities and local indigenous communities.

l. Social forestry

Efforts to increase forest cover as protection of forest areas while developing/enhancing community welfare through access to forest management.

m. Development and consolidation of Customary Forests

Efforts to strengthen customary forests in increasing protection of forest areas and strengthening forest management by customary law communities.

n. Introduction of ecosystem replication, green open space and eco-reparian.

Efforts to build green open spaces and/or land restoration (degraded land), especially in densely populated areas by adopting appropriate ecosystems, and/or simultaneously structuring rivers to improve water quality.

o. Supervision and law enforcement in supporting the protection and security of forest areas.

Efforts are made through the development of a daily monitoring system, integrated patrols as well as procedural law and the application of legal sanctions.

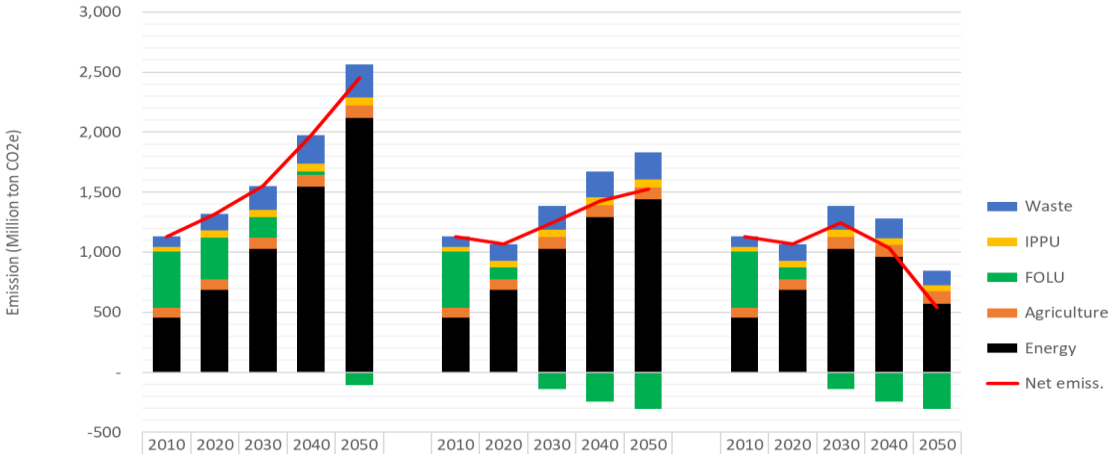
BAB II
INDONESIA LTS-LCCR, NDC, AND ENVIRONMENTAL AND FORESTRY INSTRUMENTS

2.1. Long-Term Strategy for Low Carbon Emissions and Climate-Resilient 2050 (LTS-LCCR 2050)

As a country vulnerable to the adverse impactss of climate change and contributing to global greenhouse gas emissions, Indonesia is strongly committed to the reduction of national GHG emissions. This is in line with Article 28H of the 1945 Constitution which states that the State must provide its citizens with a decent life and the environment and become the basis of Indonesia's commitment to climate change.

To ensure the achievement of the objective of the Paris Agreement in preventing global temperature rise, Decision 1/CP.21 Article 4 Paragraph 19 of the Paris Agreement (PA) mandates countries ratifying the PA to develop long-term low-emissions plans (LTS). In this regard, the Indonesian government has established the Long-Term Strategy of Low Carbon Emissions and Climate-Resilient through the LTS-LCCR 2050 document which was submitted to the United Nations Framework Convention on Climate Change (UNFCCC) in the month of July 2021.

Through the vision presented in the LTS-LCCR document, in the most ambitious scenario (Low Carbon Scenario Compatible with Paris Agreement target; LCCP), Indonesia will increase its GHG emission reduction ambitions with a national peak of net GHG emissions (all sectors) achieved in 2030, of 1,244 million tonnes CO2e or equivalent of 4.23 tonnes of CO2e per capita. After that, the net emission value will continue to decline and reach a net emission level of 540 million tonnes of CO2e by 2050 or equivalent to 1.6 tonnes of CO2e per capita (**Figure 1**), and continue to explore opportunities to achieve faster progress toward net zero emissions (NZE) in 2060 or earlier (Republic of Indonesia 2021a).



	2010	2020	2030	2040	2050		2010	2020	2030	2040	2050		2010	2020	2030	2040	2050
	CPOS						TRNS						LCCP				
Waste	89	139	198	236	272		89	139	198	217	223		89	139	198	170	120
IPPU	35	55	62	66	70		35	55	62	63	66		35	55	62	55	50
FOLU	470	349	170	29	-109		470	98	-140	-246	-304		470	98	-140	-246	-304
Agriculture	84	87	93	99	106		84	88	94	98	102		84	88	94	98	102
Energy	453	688	1,03	1,54	2,11		453	688	1,03	1,29	1,43		453	688	1,03	960	572
Net emiss.	1,13	1,31	1,55	1,97	2,45		1,13	1,06	1,24	1,42	1,52		1,13	1,06	1,24	1,03	540

Figure 1. Emission projectionsi in CPOS, TRNS, and LCCP scenarios

In the year of peak emissions, forestry and other land use sector has reached a net sink with an absorption value of 140 million tonnes of CO2e, and continues to increase and will reach an absorption value of 304 million tonnes of CO2e. The FOLU sector plays an important role in efforts to achieve national NZE targets, particularly to compensate for emissions from difficult-to-reduce sectors, especially the energy sector, so that the ability to maintain net sink trends after 2030 will determine the fulfilment of Indonesia's NZE ambitions.

Achieving these ambitious targets requires fundamental changes in the energy system, as well as in food and land use systems by minimising trade offs with respect to targets for energy security, food security, biodiversity conservation, reduced deforestation, water use, and land use competition. In this respect, the LTS-LCCR plays an important role in: (i) aligning climate objectives and targets to national, sub-national and international objectives, including the SDGs; (ii) engaging Non Party Stakeholders (NPS), (iii) expand innovation opportunities and (iv) enable communities to benefit from them.

The LTS-LCCR document will also reinforced One Hundred Years of Indonesia's Vision (2045 Indonesia Vision) towards a developed and prosperous country. The LTS-LCCR is designed to achieve an equilibrium between emissions reduction and economic development, by integrating emission reduction, economic growth, equity and climate-resilient development into the main objectives of the LTS-LCCR.

Indonesia's vision for a Low-Emissions and Climate-Resilient Development by 2050 is reflected into three key scenarios: (i) Current Policy Scenario (CPOS), (ii) the Transition Scenario (TRNS) and (iii) Low Carbon Scenario Compatible with Paris Agreement Target, LCCP).

The CPOS scenario is an extension of the unconditional NDC scenario (CM1), the LCCP scenario assumes a more progressive implementation of mitigation actions with the aim of achieving the NZE condition whose targets are more ambitious than the conditional NDC scenario (CM 2). Meanwhile, transition scenarios are scenarios that bridge the transition process from CPOS to LCCP scenarios. By sector, the ambitions of the FOLU sector and the agricultural sector are only translated into two scenarios, namely the CPOS and LCCP scenarios.

Under the CPOS and TRNS scenarios, peak net emissions are not achieved before 2050 (**Figure 1**). In the CPOS scenario, emissions will increase significantly, even after 2030, while in the TRNS scenario, emissions will increase more slowly after 2030 than the CPOS scenario, with a net emission value of 1,526 million tCO_2e or 4.53 tonnes CO_2e per capita in 2050. Under the LCCP scenario, emissions will decline rapidly after 2030 and reach 540 million tonnes CO_2e in 2050 or 1.61 tCO_2e per capita (**Figure 1**).

Graph of the LTS per sector (**Figure 1**) clearly indicates, that to achieve the most ambitious LTS-LCCR commitments, Indonesia needs to substantially reduce emissions from the energy sector, in parallel with efforts to convert the forestry and land use sector from a net emitter to an absorber (net sink). Significant efforts to reduce emissions from the FoLU sector emissions and convert them to net sinks by 2030 (in the LCCP scenario) will depend in large part on the success of the following efforts:

a. reducing emissions from deforestation;
b. reducing emissions from peatlands (peat decomposition and peat fires);
c. increasing the capacity of natural forests to sequester carbon through reduced forest degradation;

d. increasing the capacity of natural forests to sequester carbon by increasing forest regeneration;
e. adopting sustainable forest practices;
f. restoring and improving peat water management;
g. restoring and rehabilitating forest (enrichment planting to enhance carbon sequestration);
h. optimalisation of the use of unproductive land for the development of forests and agriculture and plantations;
i. iIncreasing land productivity and planting index;
j. preventing the conversion of agricultural lands into non-agricultural lands in Java;
k. reducing food loss and food waste.

The relationship between NZE and FOLU Net Sink can be emphasised as follows:

1. Through the LTS-LCCR document, Indonesia expresses its vision of achieving a net zero emission from aggregate emissions across sectors or what is known as Net Zero Emission (NZE) by 2060 or earlier. To reach the NZE condition, the emission peak must be reached promptly, to enable the emission curve to be immediately lowered, so as not to slow down the NZE period.
2. In the process towards NZE, emission reductions from hard-to-abate sectors, such as the energy and industry sectors, must be accompanied by emission reductions and increased absorption from the forestry and land use sector.
3. In Indonesia's LTS LCCP scenario, forestry and land use sector has reached a net sink condition, a condition where the absorption rate is higher than the emissions generated in the FOLU sector, well before the NZE condition is reached, that is in 2030 (**Figure 1**).
4. In this case, the achievement of the FOLU net sink does not necessarily indicate the achievement of Indonesia's Net Zero Emission vision. However, the achievement of Indonesia's FOLU net sink is an important key and the first step that can bring Indonesia to a state of NZE in 2060 or earlier.
5. In the LTS-LCCR document, mangroves are not included in the forest and land sector. In the future, mangroves are expected to be included in blue carbon (carbon stored in coastal ecosystems, including aquatic ecosystems, namely mangroves, seagrass beds and coral reefs). Mangroves have been included in the national GHG under the wetland category (more on the vegetation cover, not yet on below ground and soil) as well as in determining the Forest Reference Emission Level (FREL) for REDD+ and estimation of REDD+ results.

2.2. Nationally Determined Contribution (NDC)

As one of the countries that have ratified the Paris Agreement, Indonesia has submitted the first NDC document in 2016 and the NDC renewal document in 2021. In the NDC commitment, Indonesia sets out its emission reduction target in an unconditional scenario led by its own efforts (unconditional; CM1) by 29% and the conditional target requiring international supports (conditional; CM2) of 41% compared to BAU in 2030 (**Table 1**) (Republic of Indonesia 2016; Republic of Indonesia 2021b).

The Indonesian government has established a mitigation road map as a benchmark for implementing the NDC. The Road Map provides guidance to stakeholders including the government, local governments, businesses and the community in an effort to achieve NDC targets by providing information on the planning, timing and setting of detailed GHG

emission reduction targets by subsector as well as identifyng all relevant aspects that contributes to the achievement of targets (KLHK, 2019).

Table 1. Sector emission reduction targets in NDC

No	Sector	2010 Emission (Million tonne CO_2e)	2030 Emission Level (Million tonne CO_2e)			2030 Emission Reduction			
						Million tonne CO_2e		% dari BaU	
			BaU	CM1	CM2	CM1	CM2	BaU	CM1
1	Energy[1]	453,2	1.669	1.355	1	Energy[1]	453,2	1.669	1.355
2	Waste	88	296	285	2	Waste	88	296	285
3	Industry	36	70	67	3	Industry	36	70	67
4	Agriculture	111	120	110	4	Agriculture	111	120	110
5	Land & Forestry[2]	647	714	217	5	Land & Forestry[2]	647	714	217
	Total	1.344	2.869	2.034		**Total**	1.344	2.869	2.034

Note: [1] including fugitive emission; [2] including peat fire

The forestry and land sector contributed to 17% of the 29% emission reduction targets for all sectors in the CM1 scenario, or 24% of the 41% emission reduction targets for all sectors in the CM2 scenario (**Table 1**). Mitigation actions in the FOLU sector are focused on five main mitigation actions, as shown in **Figure 2.**

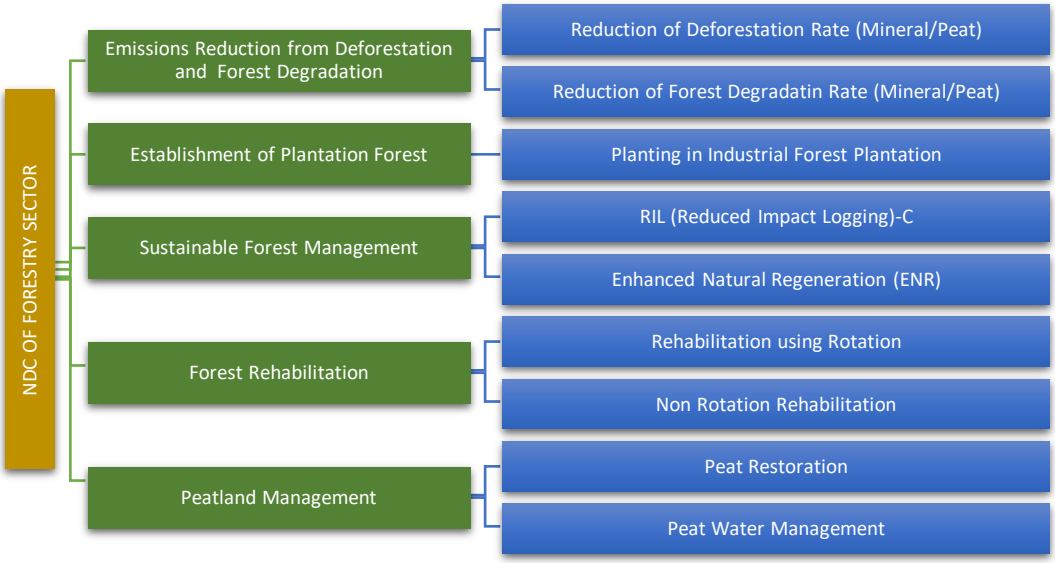


Figure 2. Action diagram of NDC mitigation road map

The mitigation measures that are expected to contribute the most to the reduction of emissions in the FOLU sector are the reductions of emissions from deforestation and degradation, peatland management, accompanied by increased carbon sequestration from plantation forest development, sustainable forest management, and forest rehabilitation activities.

Mitigation scenarios for the FOLU sector were developed from the land use module, the activity module and the emissions calculation module (KLHK, 2019). Land use and mitigation modules interact with one another based on socioeconomic assumptions (e.g. Gross Domestic Product, animal and human populations growth, key commodity production targets, and levels of food and feed consumptions, etc.) and land capacity, which is determined from crop productivity and planting index. As a result of the linkage between land capacity assumptions and mitigation activities and land use modules, reducing emissions in the forestry sector will be determined by the efficiency of land use in the agriculture sector.

The three NDC scenarios for the forestry and land sector (BAU, CM1, and CM2) refer to the same socioeconomic assumptions, including national economic growth and population growth rates. The factors that separate the three scenarios are mitigation policy assumptions and the intensity of mitigation activities, which have an impact on the different dynamics of land use in the three scenarios. **Table 2** shows the extent of mitigation implemented for each NDC scenario**.**

Table 2. Area targets for implementation of NDC mitigation actions

No	Action	Scenario	Annual Average	Cumulative			
				2013-2019	2013-2024	2013-2029	2013-2030
1	Mineral Land Deforestation Rate (000 hectares)	BAU	802	6,023	9,956	13,692	14,433
		CM1	400	3,183	5,056	6,837	7,193
		CM2	229	2,081	3,072	3,943	4,117
2	Peatland Deforestation Rate (000 hectares)	BAU	61	408	668	1,025	1,104
		CM1	4	32	56	72	75
		CM2	2	19	28	32	33
3	Mineral Land Degradation Rate (000 hectares)	BAU	818	6,114	10,129	13,960	14,721
		CM1	400	3,191	5,065	6,848	7,205
		CM2	233	2,110	3,124	4,022	4,203
4	Peatland Degradation Rate (000 hectares)	BAU	62	410	672	1,030	1,109
		CM1	4	33	56	73	76
		CM2	2	20	29	33	34
5	Sustainable Forest Management (000 hectares)	BAU	23	83	202	369	409
		CM1	170	647	1,542	2,773	3,058
		CM2	321	1,276	2,982	5,265	5,784
6	Rate of Non-rotational Rehabilitation (000 hectares)	BAU	97	680	1,166	1,652	1,749
		CM1	104	727	1,246	1,765	1,869
		CM2	173	1,211	2,076	2,942	3,115
7	Rate of Rotational Rehabilitation (000 hectares)	BAU	110	769	1,318	1,867	1,977
		CM1	173	1,211	2,076	2,942	3,115
		CM2	156	1,090	1,869	2,648	2,803
8	PBPH Development Rate (000 hectares)	BAU	150	1,050	1,800	2,550	2,700
		CM1	320	2,240	3,840	5,440	5,760
		CM2	320	2,240	3,840	5,440	5,760
9	Peatland Restoration (000 hectares)	BAU	-	-	-	-	-
		CM1	70	489	837	1,186	1,256
		CM2	156	1,091	1,871	2,651	2,807
10	Peatland Water System Improvement (000 hectares)	BAU	-	-	-	-	-
		CM1	-	634	864	864	864
		CM2	-	749	864	864	864

Note: [1] For deforestation and degradation, the cumulative calculation is from 2013 in accordance with REDD, while the others from 2011 correspond to the base year and the end of the cumulative period is the year at the end of the RPJMN period (2015-2019, 2020-2024, 2025-2029).[2] Rehabilitation refers only to dry land. [3] Total area of plantation forest built, [4] Mangrove restoration has not been taken into account in the NDC, especially the increase in soil carbon. [5] Actual is data from 2013-2017 or conditions in 2017.

Referring to Decision 1/CP.21 Article 4 paragraph 2, NDC is the soul of the Paris Agreement and a commitment that must be fulfilled for the ratifying countries of the Paris Agreement, which must be renewed every five years. Meanwhile, the Long Term Strategy (LTS) is a long-term vision or aspiration of a country to achieve the target of holding the temperature increase at 1.5°C. In this case, the achievement of the LTS target (**Table 3**) does not only limit the national conditions on a country scale, but also considers the conditions of other countries or on an international scale because it includes the context of emissions, which are global externalities.

Table 3. Mitigation action targets for NDC-CM1 dan LTS-LCCP (000 ha)

Mitigation action	NDC CM1			LTS LCCP		
	2013–2020	2021–2024	2025–2030	2013–2020	2021–2024	2025–2030
Deforestation on minela land	3.638	1.418	2.136	2.279	675	1.019
Deforestation on peatland	36	19	20	145	43	65
Degradation of concession forest	NA	NA	NA	1,320	385	578
PHL	798	1.542	3.058	1,010	1.413	2.207
PBPH-HT	2.560	1.280	1.920	2.560	1.280	1.920
Rotational RHL	831	415	623	1,004	502	753
Non rotational RHL	1.384	692	1.038	1.115	558	836
Peatland water management	713	864	864	624	785	946
Peatland restoration	558	279	419	1,140	579	728
Integration of livestock with plantation and forestry	NA	NA	NA	1,280	580	812

Success towards the NZE is largely determined by the international commitment to achieving the Paris Agreement targets as part of a global effort. Decision CP.21 Article 9 emphasises the important role of developed countries to provide financial support to developing countries, while CP.21 article 6 states the important role of international carbon markets to meet more ambitious targets for mitigation and adaptation actions.

To achieve long-term targets, NDC plays a role in bridging emission reduction commitments towards net sinks by strengthening and increasing mitigation actions and international support, especially in the land and forestry sector (one of the key sectors). In terms of NDC commitments, the FOLU sector has experienced a downward trend in emission values since 2010, but it is still a net emitter of GHGs, with emissions in 2030 of 216 million tCO2e. Meanwhile in the LTS scenario, which is in line with the Paris Agreement (LCCP) target. This sector has reached a net sink condition with an absorption value of 140 million tCO2e (

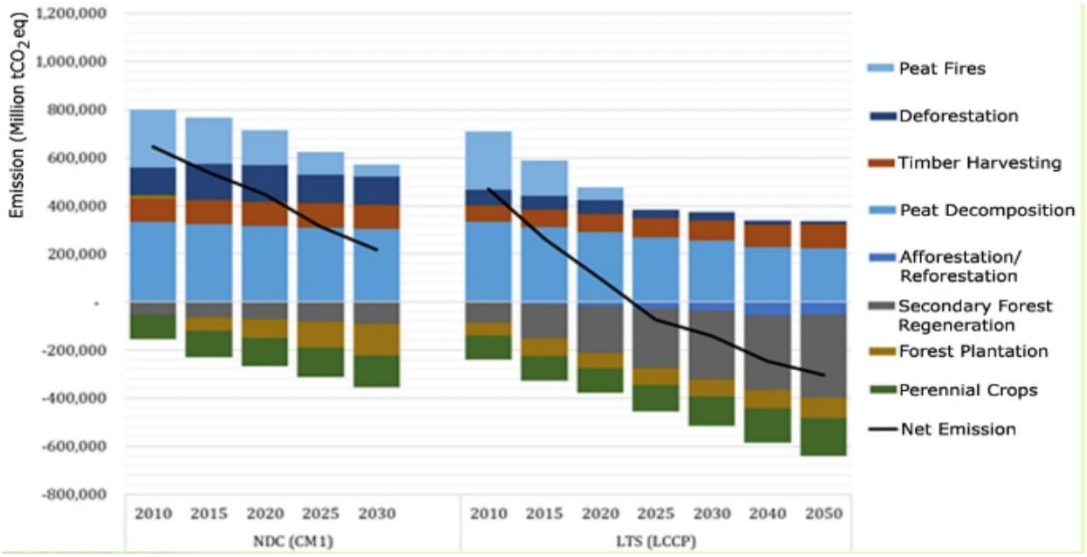


Figure 3).

Figure 3 Projected emissions from the FOLU sector in the NDC (CM1) and LTS (LCCP) scenarios

*Note: The net emissions aggregates of the FOLU sector for the LTS scenario may refer to **Figure 1**.*

To achieve a net sink, the mitigation actions contained in the NDC target still have to be increased in order to maintain the trend of reducing emissions in the FOLU sector. For this reason, it is necessary to strengthen work in **Indonesia's FOLU Net Sink 2030** Programme. Implementing mitigation actions within the Indonesia's Net Sink 2030 Programme, especially reducing deforestation and emissions from peat ecosystems, is an important step towards avoiding locked-in emission.

In the context of the FOLU sector, locked-in emissions are related to damage to ecosystems, which are difficult to restore to irreversible. For example, changes in the ability of peatland ecosystems to absorb water from hydrophilic/water-loving to hydrophobic/water-repelling, which is the beginning of dry conditions (Noor *et al*., 2014). In a locked-in condition, the emission of the FOLU sector in the future will increase, which will cause the burden of mitigation costs to be higher. With the progress of studies carried out through recovery work in Central Kalimantan during 2019 and 2020, it appears that peat can be restored and it is imperative that peat domes must be protected to prevent exploitation. An illustration of this type will be an important note and step to be strengthened in the policy work and operations of this FOLU net sink.

To achieve a net sink, the intensity of the implementation of mitigation actions must be increased as soon as possible. As a result, this indicates the high urgency of international support, both in the context of research collaboration, investment, and technology transfer. In the context of the forestry and land sector, success in achieving net sinks must indirectly synergise with the agricultural sector. Increasing land-use efficiency along with high agricultural productivity is the key to reducing pressure on new land clearing from natural forests. Fulfilling future land needs must be done by optimising the use of unproductive land and large investments for the development of very high-yielding varieties and low carbon and climate change adaptive cultivation technologies. In addition, food diversification efforts, especially from NTFP commodities, can have a positive impact on reducing land demand for agricultural land extensification, and suppressing the conversion of productive agricultural land and rice fields, especially in Java.

Currently, several international trade or export partner countries (China, America, Japan, Britain, South Korea, Australia, etc.) have signalled their country's commitment to achieving net zero emissions, most of which will be achieved by 2050. This means that the demand for agricultural products with a low carbon footprint will be even higher. Increasing land-use efficiency in meeting agricultural production targets through mixed farming systems, such as the integration of livestock, food crops, plantations, and forestry, is an important strategy, and thus agricultural products produced will have a low carbon footprint.

2.3. Environmental and Forestry Policies and Instruments

In order to support the LTS-LCCR policy, NDC, and action plans for emission reduction activities and targets in the FOLU sector, the Ministry of Environment and Forestry has translated these commitments and policies into forest area plans through the National Forestry Plan (RKTN) and development plans through the Strategic Ministry of Environment and Forestry. The RKTN contains macro directions for the utilisation of spatial or space and the potential of forest areas for forestry development and development outside of forestry using forest areas on a national scale for a period of 20 years (2011–2030).

Based on various considerations, namely: a) various strategic changes to the environment, b) adjustment to the development of national, regional and global strategic paradigms and challenges, c) alignment with relevant laws and regulations, d) structural reform of forestry management up to 2030 and the existence of changes in global commitments, one of which is the commitment to reduce greenhouse gas emissions from the forestry sector through NDC, therefore the RKTN has been revised in 2019.

The directional uses in forest areas in the revised RKTN that have adopted the NDC need to be confirmed through the Ministry's Strategic Plan and monitored and evaluated in order to ensure forestry programmes and activities implemented at the national, regional, and site levels can support the achievement of the emission reduction targets set. In addition, this is proclaimed by the Government of Indonesia as an integral part of the national development plan.

One of the general policy directions in the RKTN is to increase mitigation and adaptation to climate change. In support of these general policies, the policies and strategies that guide the use of space in forest areas to ensure efforts to achieve NDC targets are met include conservation areas, protected areas for natural forests and peat ecosystems, priority areas for rehabilitation, areas for corporate-based forest utilisation, areas for community-based forest use, and areas for non-forestry (**Table 4**).

Table 4. Directional uses for forest areas according to RKTN

Directional use by 2030	Area Function (million ha)				Total
	HK	HL	Limited HP	Permanent HP	
Areas for conservation	26.42				26.42
Areas for the protection of natural forests and peat ecosystems	-	24.30	5.83	4.02	34.15
Areas prioritise for rehabilitation	1.00	1.82	0.39	0.38	3.59
Areas for corporate-based forest use	-	0.47	15.86	19.62	35.95
Areas for community-based forest use	-	2.59	4.45	5.7	12.74
Areas for non-forestry	-	-	-	-	13.07
Total	27.42	20.18	26.53	29.72	
Total effective area of forest in 2030	112.85				

Based on the directions in the policy, action activities, and space utilisation in the LTS-LCCR, NDC, RKTN documents, the FOLU Net Sink 2030 Operational Plan (RENOP) is prepared as a detailed follow-up plan. This RENOP is an activity plan consisting of 11 action plans to achieve GHG emission reduction targets, in accordance with NDC commitments with a net sink approach in 2030 in the forestry and land-use sector.

2.3.1. FOLU Sector General Policy towards Net Sink

Increasing the commitment of the FOLU sector towards net sinks requires a policy transformation that can encourage systemic changes in future land use, including:

1. **Forest area preconditioning activities** are an important foundation in laying the foundation for forest management towards sustainable forests. Determination of forest area is the main enabling condition for all business and non-business activities in forest areas. The main purpose of establishing this forest area is to create a forest area that is stable, has clear status, location, boundaries, area, and its existence is recognised by the community. In addition, it should be free from the rights of third parties. Accelerating the determination of forest areas is a priority activity as mandated by Act Number 11 of 2020 concerning Job Creation. With this mandate, the Government of Indonesia (MoEF) has the task of completing the determination of forest areas by 2023 at the latest. This is a major undertaking that requires the

cooperation of various elements. Based on data from the Directorate General of Forestry Planning and Environmental Management (until January 2022), the total area of forest area that has been successfully determined by the MoEF is 90,526,807 ha (71.96%) of the total forest area in Indonesia (±125,795,306 ha), with a boundary length forest area of ±438,380 km. Owing to the arrangement of forest area boundaries in 2021, there is a potential for forest area determination of ± 11,600,403 ha. The planned completion of forest area designation is targeted for completion in 2022 and 2023, which is ±23,668,096 ha with a boundary length of ± 61,299 km.

2. **Maintaining the remaining natural forests** through the use of natural forests directed towards environmental services and Non-Timber Forest Products (NTFPs), and developing low-carbon spatial policies. MoEF has issued a multi-business policy that can be used to protect natural forests within concession areas. Utilisation of natural forests for non extractive business activities can be directed to support mitigation actions in order to reduce deforestation. The obligation to develop low-carbon spatial planning will support efforts to conserve natural forests.

3. **Encouraging the regeneration of degraded natural forests.** In the LTS-LCCP scenario, secondary forest protection to optimise the regeneration process plays an important role in getting to the net sink. Policies regarding SFM certification and the adoption of RIL-C and Intensive Silviculture (SILIN) technology can serve as the basis for legal instruments in increasing secondary natural forest regeneration.

4. **The efficiency of land use and optimisation of unproductive land.** The reduction in deforestation rates is largely determined by the level of efficiency of land use. Increasing production through extensification programmes is not only against the mitigation commitments but also unfit to compete in international markets that apply the principle of sustainability of a product/commodity. Through social and forestry multi-business schemes for business licensing for forest concessions, unproductive land in forest areas can be utilised to increase food security and community involvement, including Indigenous Law Communities (MHA).

5. **Acceleration of carbon sequestration activities** in forest areas to ensure the sustainability of ecosystem services. The activities of rehabilitation and protection of natural forests not only contribute to the absorption of carbon stocks but also maintain and improve the environmental services of an ecosystem to support economic activities in other sectors. Through PerMenLHK No. 8/2021, planting NTFPs and food crops on productive land within concession areas becomes possible. In addition, it also regulates the improvement period for cultivation activities that have been built in forest areas. The cultivated land is directed to an agroforestry system that can improve the quality of land cover and vegetation carbon stocks.

6. **Development of fiscal policy for the FOLU sector.** The expansion of mitigation actions in the FOLU sector in a short time is only possible if ecosystem-based fiscal policies are prepared simultaneously. The funding scheme will also increase participation in mitigation actions by non governmental organizations. With the issuance of Presidential Regulation Number 98 of 2021 concerning the Implementation of Carbon Economic Values for Achieving Nationally Determined Contribution Targets and Control of Greenhouse Gas Emissions in National Development, it is believed to encourage the participation of all parties in implementing a low-carbon development system.

7. **Law enforcement activities.** Consistent and intensive enforcement of Environmental and Forestry Laws will prevent deforestation, forest area

degradation, forest and land burning, and mangrove and peatland destruction, both for licenced activities through supervision and illegal activities through security operations. To provide a deterrent effect on perpetrators who commit environmental and forestry violations, three law enforcement instruments are applied, namely administrative sanctions, criminal law enforcement, and civil law enforcement. Perpetrators who commit violations are also subjected to heavy sanctions in the form of additional penalties and the imposition of administrative fines, as stated in the UUCK (Undang-Undang Cipta Kerja/Act on Job Creation). The community is also given an opportunity to play an active role in submitting environmental and forestry complaints.

8. **Activities to strengthen the FOLU sector database.** The various mitigation actions carried out must be measurable and need to be documented in an organised and quality database. They must meet the Measuring, Reporting, and Verification (MRV) requirements of the FOLU sector.

In support of its various policies in general, the Government of Indonesia has issued various transformative policies to support the achievement of NDC targets through increasing the implementation of FOLU sector mitigation actions towards net sinks. Some of the key land and forestry sector policies that can promote systemic changes in land use going forward are presented in **Table 5.**

Table 5. Key policies towards the FOLU 2030 net sink

Mitigation Action	Legal Basis	Information
Reduction in deforestation and natural forest degradation	Government Regulation (PP) No.104/2015	Regulate changes in the utilisation and functions of forest areas
	Presidential Instruction (InPres) No. 10/2011 concerning Moratorium On New Licences and Improved Governance, which later became InPres No. 5/2019 concerning Termination of New Permits and Improving Governance of Primary Natural Forests and Peatlands. In the operation, , every 6 months, this Presidential Instruction is always accompanied by a SK MenLHK, which regulates the Indicative Map of Moratorium on New Licences (PIPPIB). The latest decree is the Decree of the Minister of Environment and Forestry No.5446/MenLHK-PKTL/IPSDH/PLA.1/8/2021 tentang Determination of the Indicative Termination Map 2021 2nd Period Granting of Business Permits, Approval for Use of Forest Areas, or Approval of Changes in Designation of New Forest Areas in Primary Natural Forests and Peatlands.	Regulate the moratorium policy and suspension of new permits and improvement of primary forest and peatland governance. This moratorium policy has been standardised into the policy concerning termination new permits and improvement of primary natural forests and peatlands governance. On non-peatland and non-primary forest areas, Business Permits may be issued for environmental service utilisation or NTFP utilisation that do not alter the landscape, not damaging the environment, and not alteringits main function.
	PerMenLHK No.8/2021 concerning the Forest Governance and The Formulation of Forest Management Plan, and Forest Use in Protection Forests and Production Forests.	Regulates the conversion of primary forest and peatland ecosystem with protection function within the working area of plantation forest
	PerMenLHK No. P.70/MENLHK/SETJEN/KUM.I/12/2017 concerning the Procedures for Reeducing Emissions From Deforestation And Forest	Regulates incentives for companies to maintain natural forests in their work areas through a REDD+ scheme.

Mitigation Action	Legal Basis	Information
	Degradation, Role Of Conservation, Sustainable Management Of Forest And Enhancement	
	PerMenLHK Regulation No. 7/2021 concerning Forestry Planning, Changes in Forest Areas Allocation, Changes in Forest Functions, and Forest Utilisation	Forest relinquishment for development purposes other than forestry activities is carried out in HPK areas by prioritising non-productive land. *Note*: *Non-productive refers to area dominated with more than 70% non-forested land
	PerMenLHK No.8/2021 concerning the Forest Governance and The Formulation of Forest Management Plan, and Forest Use in Protection Forests and Production Forests.	The delineation agreement within the Forest Utilisation Business Licence (PBPH) must reflect the existence of protection areas, which include peatland, water catchments, cultural heritage, etc. Protection blocks in production forests are limited to NTFP activities and environmental services.
Sustainable forest management	Act (UU) 41/1999 concerning Forestry and UU 18/ 2013 concerning Prevention and Eradication of Forest Degradation as amended by Act No. 11/2020 concerning Job Creation	1) Efforts to prevent and protect the forest will be carried out by the forest police; Application of Criminal Law for activities that carry out deforestation and natural forest degradation by PPNS.
	PP No. 23/2021 conerning Forestry Implementation	2) Forest relinquishment in Convertible Production Forest, can only be conducted on non-productive Convertible Production Forest.
	PerMenLHK No.8/2021 concerning the Forest Governance and The Formulation of Forest Management Plan, and Forest Use in Protection Forests and Production Forests	The Forest Products Utilisation Business Unit may carry out more than one forestry system, depending on the characteristics of forest resources and their environment, including intensive silviculture, obligation for sustainable forest management certification (SVLK) which is regulates in PerMenLHK No. 8/2021
Enhancemnt of carbon stocks	PP No.23 concerning Forestry Implementation and 24/2021 concerning Procedures for Imposing Administrative Sanctions and Procedures for Non-Tax State revenues Derived from Administrative Fines in the Forestry Sector	This policy is an extension of the UUCK that regulates the continuation of cultivation activities in forest areas through the TORA scheme and social forestry to be converted into an agroforestry system to improve the quality of land cover as part of a *jangka benah* programme..
	PerMenLHK No.8/2021 concerning the Forest Governance and The Formulation of Forest Management Plan, and Forest Use in Protection Forests and Production Forests	Support and incentive for RHL and optimisation of unproductive land through planting multi-purpose tree species (MPTS) in agroforestry system.
	PerMenLHK No.8/2021 concerning the Forest Governance and The Formulation of Forest Management Plan, and Forest Use in Protection Forests and Production Forests	Policies that allow planting of non-timber forest product (NTFPs) (e.g. food crops, bioenergy, and agroforestry) on non-productive land or clear cutting with artificial regeneration (THPB) in natural forest with a concession forest.
	PerMenLHK No. 105/2018 concerning Procedures for Implementation, Supporting	Synchronisation of RHL with social forestry permits, i.e. requests for

Mitigation Action	Legal Basis	Information
	Activities, Providing Incentives, as well as Fostering and Controlling Forest and Land Rehabilitation Activities	proposals for RHL activities can be submitted by the head of community groups who holds the social forestry permit.
Peat ecosystem management	PP No. 57/2016 amending PP No. 71/2014 on Protection and Management of Ecosystem of Peatlands	Regulate the use of peatland. This regulation mandates the government to develop an integrated peatland protection plan that is integrated and restore degraded peatlands.
	PerMenLHK No. 15/2017 concerning Procedures for The Maesurement of Grounwater Level at Peatland Ecosystem Organization Points	Mandate peatland managers to maintain peatland water level not more than 40 cm.
	SK MenLHK No. 246/2020 concerning National Peat Ecosystem Management Plan (RPPEG)	National RPPEG 2020-2049 as a guideline for systematic and integrated peatland management to preserve the function of the peat ecosystem and prevent damage to the peat ecosystem.
Mangrove ecosystem management	UU 32/2009 concerning Environmental Protection and Management as amended by Act No. 11/2020 concerning Job Creation	Regulates Environmental Damage Standards
	PP 22/2021 concerning Implementation of Environmental Protection and Management	Regulate the Standard Criteria for Mangrove Damage and Implementation of Compliance Monitoring
Forest and land fores control	InPres No. 11/2015 concerning Forest and Land Fire Control	A policy that mandates local governments to develop a forest and land fire control system for their jurisdictions and impose sanctions for business actors who do not implement fire management in their areas
	PerMentan No. 5/2018 concerning Land Clearing and/or Plantation Land Management Without Burning	A policy that mandates concessionaires to maintain environmental sustainability in their work areas by avoiding the practice of burning for land clearing
	UU 32/2009 concerning Environmental Protection and Management as amended by Act No. 11/2020 concerning Job Creation	1) Central and Provincial Governements will conduct the supervision 2) Application of criminal and civil law enforcement instruments for perpetrators of forest and land burning.
	Act (UU) 41/1999 concerning Forestry and UU 18/ 2013 concerning Prevention and Eradication of Forest Degradation as amended by Act No. 11/2020 concerning Job Creation	Regulate the prohibition of forest burning
	PP 4/2021 concerning Control of Environmental Damage and/or Pollution related to Forest and/or Land Fires	Regulates efforts to prevent, control, and recover as well as monitoring over environmental damage and/or pollution related to forest and/or land fires.
	PermenLHK No. 32/Menlhk/Setjen/Kum.1/3/2016 concerning Forest and land Control	Provisions for controlling forest and land fires by permit holders

Mitigation Action	Legal Basis	Information
Biodiversity conservation	UU No.26/2007 concerning Spatial Planning as amended by Act No.11/2020 concerning Job Creation, PerMenLH No.29/2009 concerning Guidelines for Biodiversity Conservation In The Regional Level, and PP No.64/2021 concerning Land Bank Agencies	Protection of High Conservation Value (HCV) areas outside the forest area can be directed for protection function in spatial planning. It is mandated that the local governments compile a biodiversity profile with APBD financing with the output in the form of biodiversity management plan. The HCV area outside unused forested area (abandoned and no control over it) falls under the authority of the land bank.
	PP No.18/2021 concerning Management Right, Land Right, Apartment Units and Land Registration and PerMentan No.38/2020 concerning Certification for the Implementation of Indonesian Sustainable Oil Palm Plantation Certification	Cultivation rights holders are obligated to manage, preserve, monitor and sustain the function of HCV areas if the conservation area is under the land use rights area. Environmental management and biodiversity are parts of the ISPO certification criteria.
	PP No.23/2021 concerning Forestry Implementation and PerDirJen KSDAE No.6/2018 concerning Technical Guidelines for Conservation Partnerships in Nature Reserves and Nature Conservation Areas	Lands in conservation forests that have been controlled and used for other purposes, are resolved using a conservation partnership mechanism, through community empowerment and ecosystem restoration schemes.
	PerDirJen KSDAE No.1/2017 concerning Technical Guidelines for Evaluating The Effectiveness of Essential Ecosystem Management and PerMenLHK No.48/2014 concerning Procedures for Ecosystem Restoration	Assessment of the management of essential ecosystems and guidelines for the protection of essential ecosystems by natural mechanisms, rehabilitation or restoration, which are determined by the degree of damage.
	UU No. 5, 1990 concerning Conservation of Natural Resources and their Ecosystems, PP No. 7/1999 concerning Preservation of Plant and Animal Species and PP No. 8/1999 concerning the Utilisation of Wild Plants and Animals	1) Engage the community In efforts to protect protected wild plants and animals through multimedia complaints services against the unlawful ownership and trafficking of protected wildlife and wild plants; 2) Conduct operations of protected wildlife, cyber patrols for illegal circulation of protected wildlife and plants, establishment of 9-K Units, development of checkpoints in traffic-prone locations; and 3) Criminal law enforcement efforts against the crime of destruction of protected areas, illegal ownership and trafficking of protected wild plants and animals.

Mitigation Action	Legal Basis	Information
	PermenLHK No. 20/Menlhk/Setjen/Kum.1/6/2018 concerning Protected Plants and Animals and PermenLHK No. 92/Menlhk/Setjen/kum.1/8/2018 tconcerning Amendments to P.20/Menlhk/Setjen/Kum.1/6/2018 concerning Protected Plants and Animals and PermenLHK No. 106/Menlhk/Setjen/kum.1/11/2019 concerning the Second Amendment to PermenLHK P.20/Menlhk/Setjen/Kum.1/6/2018 Protected Plants and Animals	Provisions regarding protected wild plants and animal species.
Cross cutting	UU No. 4/2011 concerning Geospatial Information amended by Law Number 11 of 2020 concerning Job Creation	Forms the basis for the management of National Geospatial Information.
	PP No.46/2016 concerning Procedures for Implementation of Strategic Environmental Assessment (SEA/KLHS).	Mandate local governments to prepare SEA, especially for regional spatial plans, long- and medium-terms development plans, and zoning plans for coastal areas and small islands as the basis for sustainable development principles.
	PP No.46/2017 concerning Environmental Economic Instruments as amended by PP No. 22/2021 concerning the Implementation of Environmental Protection and Management	Innovative policy regarding the provision of incentives (simplification of administrative processes, rewards, etc.) for concessionaires implementing sustainable business processes.
	PP No.23/2021 concerning Forestry Implementation	Priority for accelerating forest area establishment as a national strategic programme.
	PP No.45/2021 concerning Implementation of Geospasial Information	Regulate the authority and person in charge of spatial data and information that facilitates planning, implementing, and evaluating GHG reduction mitigation actions.
	PerMenKeu Nomor 19 Tahun 2021 tentang Penggunaan, Pemantauan, dan Evaluasi Dana Bagi Hasil Sumber Daya Alam Kehutanan Dana Reboisasi, PP No.26/2020 tentang Rehabilitasi dan Reklamasi Hutan, dan PerMenLHK No.2/2020 tentang Tata Cara Pelaksanaan, Kegiatan Pendukung, Pemberian Insentif, Serta Pembinaan dan Pengendalian Kegiatan Rehabilitasi Hutan dan Lahan	Penggunaan dana DBH DR untuk pembiayaan rehabilitasi luar kawasan, pembangunan dan pengelolaan HHBK atau jasa lingkungan, pemberdayaan masyarakat perhutanan sosial, operasionalisasi KPH, dan pencegahan dan penanggulangan kebakaran hutan dan lahan (RHL). Sumber pembiayaan lain untuk kegiatan rehabilitasi lahan dapat terdiri dari APBN, APBD, DAK, dll. Menteri, gubernur, atau bupati/walikota juga dapat memberikan insentif terhadap kegiatan RHL (berupa kemudahan pelayanan dan penghargaan).

Mitigation Action	Legal Basis	Information
	PerMenLHK Nomor 9 Tahun 2021 tentang Pengelolaan Perhutanan Sosial	Perhutanan sosial adalah sistem pengelolaan hutan lestari yang dilaksanakan dalam kawasan hutan negara atau hutan hak yang bertujuan untuk meningkatkan kesejahteraan masyarakat setenpat dan dapat berdampak pada kegiatan perProtectionan deforestasi, peningkatan cadangan karbon, pengelolaan ekosistem gambut, pengendalian kebakaran, dan konservasi keanekaragaman hayati. Pembiayaan pengelolaan perhutanan sosial bersumber dari APBN, APBD, dan sumber dana lain yang sah dan tidak mengikat.
	PerMenLHK Nomor 8 Tahun 2021 mengenai Tata Hutan dan Penyusunan Rencana Pengelolaan Hutan, serta Pemanfaatan Hutan di Hutan Protection dan Hutan Production	PBPH dapat melakukan kerja sama (kemitraan) dengan koperasi masyarakat setempat dan/atau usaha mikro, kecil, dan menengah dalam bentuk penyertaan saham dan kerja sama usaha.
	PerMenLHK Nomor 24 Tahun 2021 tentang Tata Cara Penyelenggaraan Informasi Geospasial Tematik Lingkup KLHK	Menjamin pengelolaan data dan informasi geospasial di lingkup LHK memenuhi kaidah pengelolaan IGT yang sesuai dengan peraturan perundangan
	SK PerDirJen PHL No.1/2020 tentang multiusaha kehutanan	Kebijakan inovatif yang mengatur pemberian izin bagi PBPH untuk melakukan kegiatan bisnis selain dari jenis usaha utama/PBPH yang sudah didaftarkan (jasa lingkungan, HHBK, dll). Skema multi usaha kehutanan akan berdampak pada perProtectionan hutan alam dari deforestasi, pengelolaan hutan lestari, peningkatan cadangan karbon, pengelolaan ekosistem gambut, pengendalian kebakaran dan konservasi keanekaragaman hayati.

2.3.2. Mangrove Related Policies

Mangroves can serve as an opportunity for further elaboration in RENOP FOLU Net Sink 2030 because mangroves' ability to reduce emissions from the land sector has not been taken into account, both in the NDC and LTS-LCCR documents. High potential of blue carbon in mangroves, includes above-ground biomass, mangrove soil, and below-ground biomass.

According to a national mangrove mapping in 2021, the total area of mangrove in Indonesia is approximately ±4,120,263 ha comprised of existing mangrove area of ±3,364,080 ha (82%) and potential mangrove habitat of ±756,183 ha (18%). The existing area of mangroves may be broken down into dense, medium and sparse canopy cover density classes and their respective areas, as shown in **Table 6**. There is potential for mangrove habitat in Indonesia, which covers an area of ±756,183 ha consisting of various land cover conditions, namely abraded areas, bare grounds, abraded mangroves, fishponds, and raised soils (aanslibbing). Among the various land cover conditions, the dominant one is fishponds with ± 84% of the potential mangrove habitat, followed by aanslibbing at ± 7%. (**Table 7**).

Table 6. Existing mangrove area in Indonesia

No	Canopy Cover Class	Area (ha)	Percentage (%)
1	Dense Mangrove	3,121,240	92.78
2	Medium Mangrove	188,366	5.60
3	Sparse Mangrove	54,474	1.62
	Total	**3,364,080**	**100.00**

Table 7. Potential mangrove habitat

No.	Area Function	Potential Mangrove Habitat					
		Abraded mangrove (ha)	Bare grounds (ha)	Abraded area (ha)	Fishpond (ha)	*Aanslibbing* (raised soil) (ha)	Total (ha)
1.	Protection Forest (HL)	1,056	9,172	188	131,128	1,418	142,961
2.	Conservation Forest (HK)	2,486	10,319	87	67,792	3,049	83,732
3.	Production Forest (HP)	1,001	7,111	105	39,261	1,360	48,838
4.	Other Land Uses (APL)	3,657	29,287	3,749	393,623	50,335	480,651
	Total	**8,200**	**55,889**	**4,129**	**631,802**	**56,162**	**756,183**

The description of the state of the existing and potential mangrove habitats can also be reviewed in terms of their growth location, within and outside the forest area. **Table 8** shows that the largest existing mangroves are found within the Production Forest (HP) area. This is because most of the existing mangroves are located in the lowlands (including the coastal area), which is a production forest (HP) area. Consequently, it is better maintained since it is a forested area. Mangrove habitat potential occurs primarily outside the forest area or Other Land Uses (APL).

Table 8. Existing mangrove area and potential mangrove habitat inside and outside the forest area

No.	Area Function	Existing mangrove (ha)	Potential mangrove habitat (ha)	Total (ha)
1.	Protection Forest (HL)	911,397	83,737	995,134
2.	Conservation Forest (HK)	748,271	48,837	797,108
3.	Production Forest (HP)	1,001,614	142,961	1,144,575
4.	Other Land Uses (APL)	702,798	480,648	1,183,446
	Total	**3,364,080**	**756,183**	**4,120,263**

Generally speaking, mangrove policies aim to protect and rehabilitate. Dense or moderate vegetation conditions are viewed as an ecosystem of mangroves with good conditions, Therefore, the mangrove management policy that can be implemented consists of maintaining and using it in a sustainable manner.

Another activity that can be undertaken on mangrove ecosystems with good conditions, is the optimisation of use using the principle of sustainable management, notably, by maintaining a balance between ecological and economic sustainability. The priority is the use of non-timber forest products (NTFP) or the use of environmental services (nature tourism) that do not damage mangrove vegetation, whereas the use of timber forest products should be avoided. The optimal use of mangroves through the maintenance of ecological and economic sustainability is key to the improvement of the well-being of the people living around the mangrove ecosystem. Empowering communities through their involvement in mangrove management and capacity building is a concern with the use and conservation of mangrove ecosystems.

If, in the mangrove ecosystem, there is a decline in the quality and quantity of vegetation condition, which leads to various land cover changes to land cover with scarce canopy cover, or becoming open land, such as abraded mangroves, abraded areas, open land, fishponds and muddy land (*aanslibbing*), it can be said that the mangrove ecosystem is in damaged state.

For damaged mangrove ecosystems, the mangrove management policies which can be implemented are the restoration and rehabilitation of mangroves.. Activities that can be carried out include Forest and Land Rehabilitation (RHL) through the planting and maintenance of mangrove plants.

Apart from the scenario and explanation above, calculating the potential of mangroves also needs to be supplemented by various activities and research related to the potential of mangrove soil and its below-ground biomass.

CHAPTER III
SPATIAL ANALYSIS OF THE FORESTRY AND LAND GHG EMISSION REDUCTION PLAN

The GHG emission reduction plan for foresty and land sector in the formulation of Operational Plan towards the Indonesia's FOLU Net Sink 2030, uses the results of the spatial analysis study of the Spatial-Based Programme Planning Integration Report on Site Level to Achieve the MoEF Development Target (Biro Perencanaan KLHK, 2021). The report was prepared using three primary pieces of information as a means of spatial-based integration, including: (1) Map of Directional Use for Forest Area Optimisation Based on High Environmental Services Index (IJLT), (2) Map of Institutional Typology, and (3) Map of Biogeophysical Index (IBGF) (Biro Perencanaan Kehutanan KLHK 2021). These three spatial information serve as "templates" that can assist the MoEF in conducting policy reviews and taking corrective steps to improve sustainable management of forests and their ecosystems as outlined in the 2020-2024 Strategic Plan of the MoEF.

The IBGF map in this analysis focuses on information on emissions, absorption as well as forest and land fires, and is not intended to represent land capability, watershed characteristics and biodiversity information in an area.

Policy reviews using the templates are undertaken in order to; (1) ensure a significant reduction in the rate of deforestation, (2) prevent forest and land fires (*KARHUTLA*) and their negative effects on the environment, health, transportation and economic growth, (3) apply the principles of environmental support and capacity in the utilisation and use of the area, (4) align the policy directions of environment and forestry development in accordance with the Sustainable Development Goals-SDG'S, (5) support the success of global cooperation to address climate change through a commitment for a NDC by reducing greenhouse gas emissions through Indonesia own efforts or with international assistance, and involving community in forest management and assigning responsibilities to all parties involved, so that forest areas and the ecosystem remain intact.

Spatial information on the direction to be taken to optimise the use of forest areas based on the environmental services index (IJLH) is required to facilitate planning that has applied the principles of carrying capacity and environmental capacity. The spatial information of the Biogeophysical Index provides an overview of the state of an area at the management unit level in relation to greenhouse gas emissions and absorption, which may be used as a basis for the determination of priority locations for programme implementation, so as to contribute to the reduction of greenhouse gas emissions caused by deforestation and degradation as well as forest and land fires, and increasing greenhouse gas uptake in line with NDC commitments.

Spatial information on institutional typology provides an overview of the institutional capacity and social capital (community conditions) at the site level, which are essential to the formulation of an integrated strategy for implementing the programme in synergy with the participation of the community and other parties in the area to ensure the existence of the forest and its ecosystem and contribute to the achievement of the SDG's goals. In order to build good coordination and synergy, attention must be paid to the existence of strong institutions in place.

Using the above stated templates (the three spatial information), along with specific or thematic spatial information, will assist in formulating corrective steps that can be taken by each directorate (Echelon 1 Work Units) of the MoEF. Corrective steps are directed at being able to; (1) change the direction of forest management which initially only focused on timber

management to forest landscape management, (2) resolve conflicts related to forest tenure cases, (3) implement community-based forest management by providing access to forest management for the community through the Social Forestry and Environmental Partnership programme, (4) internalising the principles of environmental carrying capacity and capacity into the preparation of the revised National Forestry Plan (RKTN) 2011-2030 as a macro spatial direction for forestry development and (5) implementing a "green economy" policy pattern, namely balancing the added economic value of forestry businesses and the use of environmental services while maintaining forest sustainability and environmental quality as well as ecosystem balance to achieve sustainable development.

Success in implementing corrective measures will lead to significant emission reductions in this FOLU sector. The relationship between the three maps and the thematic maps in determining the direction of integrated programmes and activities is presented in

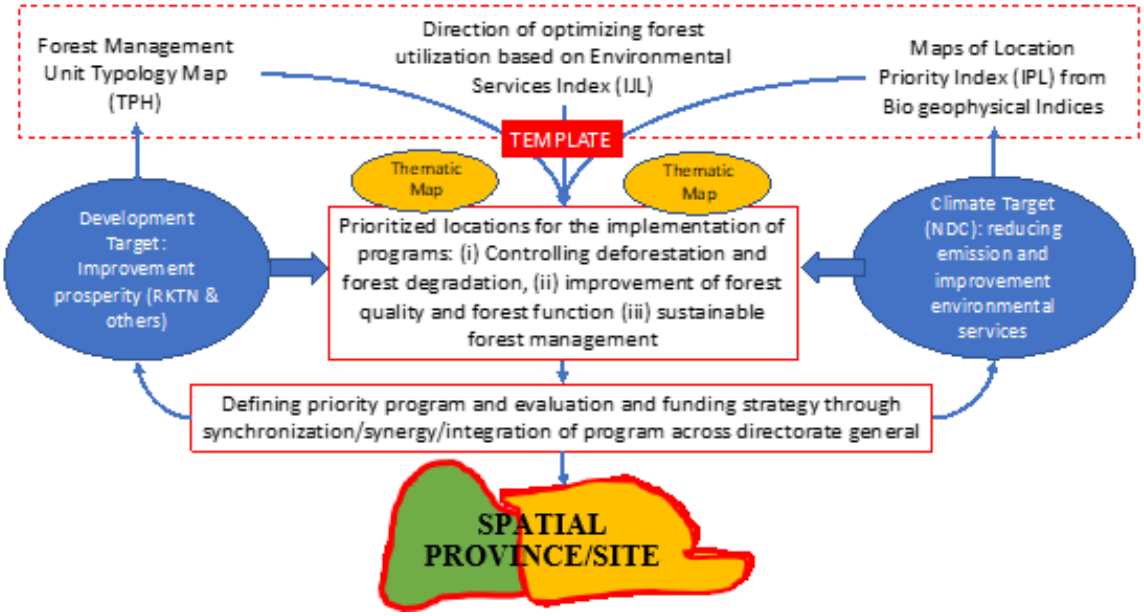


Figure 4. Spatial analysis of priority determination of locations, programmes/activities, and implementation patterns of greenhouse gas emission reduction activities towards FOLU Net Sink 2030

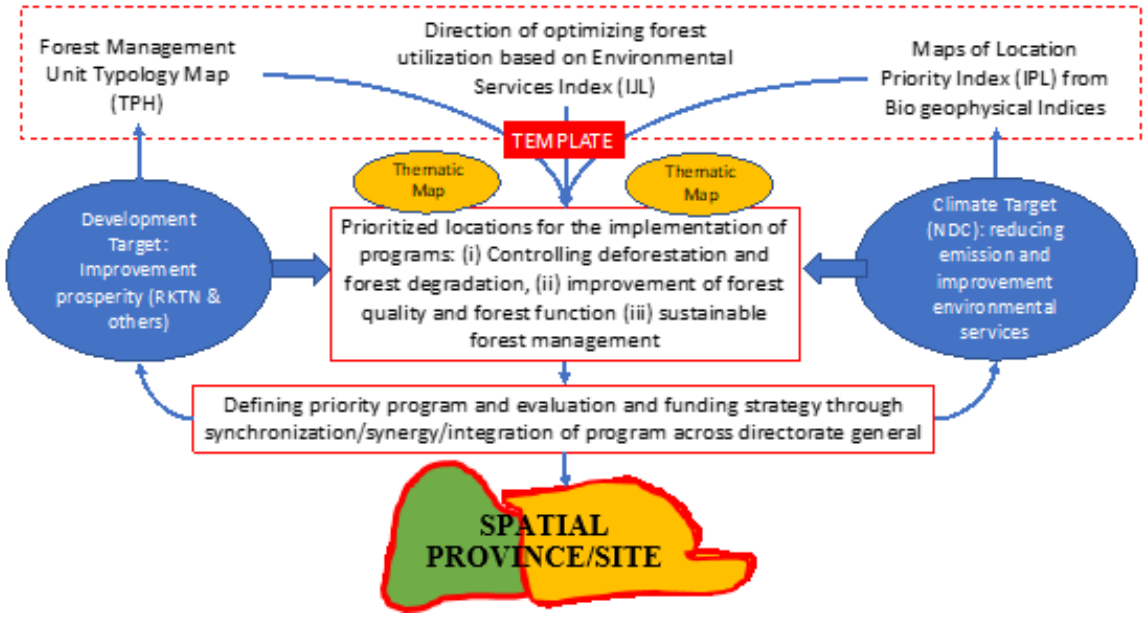


Figure 4. Spatial analysis of priority determination of locations, programmes/activities, and implementation patterns of greenhouse gas emission reduction activities towards FOLU Net Sink 2030

3.1. Map of Directional Use of Forest Optimisation Based on High Environmental Services Index (IJLT)

Map for directional use for optimising forest utilisation (**Figure 5**) is prepared by taking into account the quality of the forest based on high carbon stocks and the level of forest canopy cover, High Conservation Value (HCV), which is determined based on the presence of mega fauna (protected wildlife: Rhino, Tiger, Elephant, Orangutan, Anoa, Gibbon, Leopard, Deer-pigs, etc), essential ecosystems (mangroves, karsts, savannas, and peat and moss ecosystems in high mountains) and protected areas (National Parks, Strict Nature Reserves, Wildlife Reserves, Nature Tourism Parks and Game Parks), as well as High Environmental Services Related to Water.

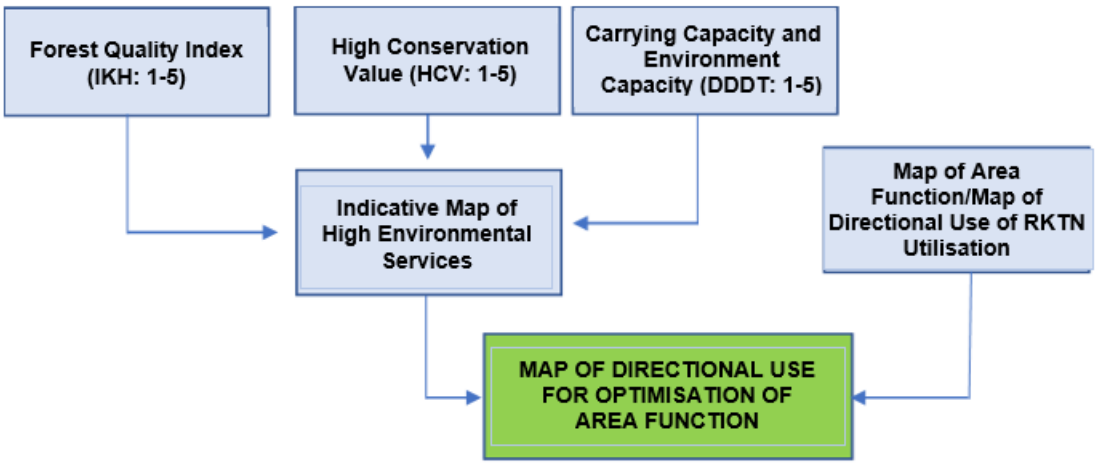


Figure 5. Spatial analysis of forest area optimisation directional use based on high Environmental Services Index (IJLH)

The directional uses for area optimisation are grouped into four, which are determined based on the conditions of the three components, namely:

1) **Protection directional use** for areas with HCV, or do not have high HCV but high forest quality and high rating High Environmental Services;

2) **Production directional use** for areas without HCV, but good forest quality and not high rating High Environmental Services;

3) **Rehabilitation directional use** for areas with HCV, low forest quality and, low or high rating High Environmental Services. Areas with damaged state, non-productive and/or have been occupied by the community, must be maintained as forest areas. Area for rehabilitation purpose that has been used by the community for agricultural or plantation activities can be rehabilitated through agroforestry rehabilitation activities;

4) **Conversion directional use** for areas without HCV, low forest quality and, low and high rating High Environmental Services. Area for conversion generally take the form of built-up areas and have been settled by the community.

Based on the results of the analysis, the distribution of the area according to the directional use of optimisation in each area is presented in **Table 8** and **Figure 6.**

Table 9. Extensive utilisation of forest area functions based on IJLH

Area Function	IJLH Directional Use							Total (ha)
	APL	Convertion	Protection	Production	Rehabilitation	Rehabilitaon with Agroforestri	Not Available (NA*)	
APL	53,472,485	568	3,175,771	10,343,627	756,438	11,361	1,351,568	69,111,818
HK	221	66,049	19,165,804	46	855,123	918,169	292,847	21,298,806
HL	580	121,989	26,406,262	137	630,931	2,515,059	354,224	30,029,182
HP	819	4,509,375	6,708,570	14,832,883	2,834,026	336,712	219,115	29,441,500
HPK	508	2,627,034	1,847,035	5,768,879	1,418,543	220,965	182,775	12,065,738
HPT	597	2,162,959	8,181,147	15,335,597	800,4	279,2	170,166	26,930,066
Blank**	1,141	14,911	492,827	642	68,255	45,604	247,618	870,998
Total	**53,476,352**	**9,502,885**	**65,977,415**	**46,281,811**	**7,363,716**	**4,327,070**	**2,818,313**	**189,747,561**

*Notes: * requiring further verification related to data and field condition; ** requiring field verification*

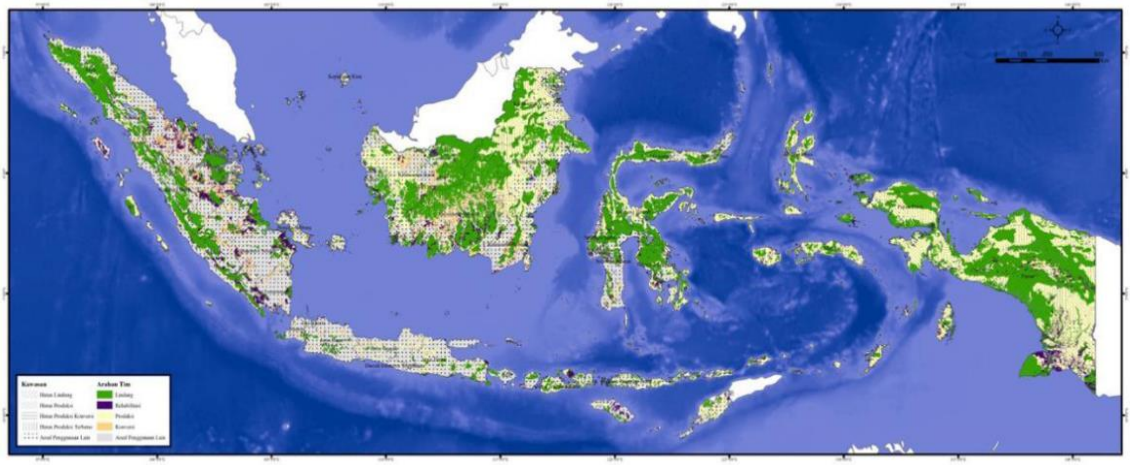


Figure 6. Distribution for the directional uses of area optimisation based on Environmental Services Index by area function

3.2. Map of Institutional Typology

One strategy for selecting optimal forest resource management institutions can be based on two objective conditions, namely: government capacity and social capital strength (Birner and Wittmer 2003). Referring to this, the KPH (FMU) management institution is carried out based on a typological approach using three indicators, namely; (1) social capital,(2) institutional capacity, and(3) potential of the FMU area.

The condition of social capital in the management unit is expressed in the form of a Social Capital Index which is determined from two indicators, namely; (1) based on agricultural activities and the presence of residents in the area measured by the percentage of agricultural land and settlements to the total area of KPH, (2) indicator of the existence of social problems that are measured by the existence of 3 types of annual FMU programmes, namely: land conflict resolution, community empowerment programmes, and fire management.

Institutional capacity is stated in the Institutional Capacity Index (IKL), which is determined from two indicators, namely; (1) the capacity of the Regional Government, which refers to the Decree of the Minister of Environment and Forestry No. SK.651/2016, and (2) the institutional capacity of the FMU as measured by four factors, namely; (a) the

condition of human resources, (b) FMU facilities/infrastructure, (c) the existence of the RPHJP, and (d) the age of the FMU, which was determined based on the time the SK RPHJP was ratified.

Based on the stages of the condition of social capital and institutional capacity, four types of SDH management were obtained, namely; (1) FMUs that belong to the group with high social capital conditions and high institutional capacity (Type-1), (2) FMUs that enter the group with conditions of high social capital. high social capital and low institutional capacity (Type-2), (3) FMUs belonging to groups with low social capital conditions and large institutional capacity (Type-3), and (4) FMUs belonging to groups with low social capital conditions and institutional capacity small (Type-4).

Potential FMU area is determined based on the area of the KPH and the percentage of the KPH area that has been encumbered by the permit. Based on these factors, the condition of FMU resources (SD KPH) is divided into four groups, namely; 1) Group A: FMU with a management area of more than 100,000 hectares and the management area that has been granted a permit is less than 50% of the area, (2) Group B: FMU with a management area of more than 100,000 hectares and a management area that has been assigned permits for more than 50% of the area, (3) Group C: FMUs with a management area of less than 100,000 hectares and management areas that already have a permit for less than 50% of the area, and (4) Group D: FMUHs with less management area of 100,000 hectares and the management area that has been granted a permit is more than 50% of the total area.

From the analysis stages of social capital, institutional capacity, and potential of the KPH area, 16 typologies of FMU will be obtained. The distribution of the 16 FMU typologies in more detail can be seen in **Figure 7** and **Table 9**.

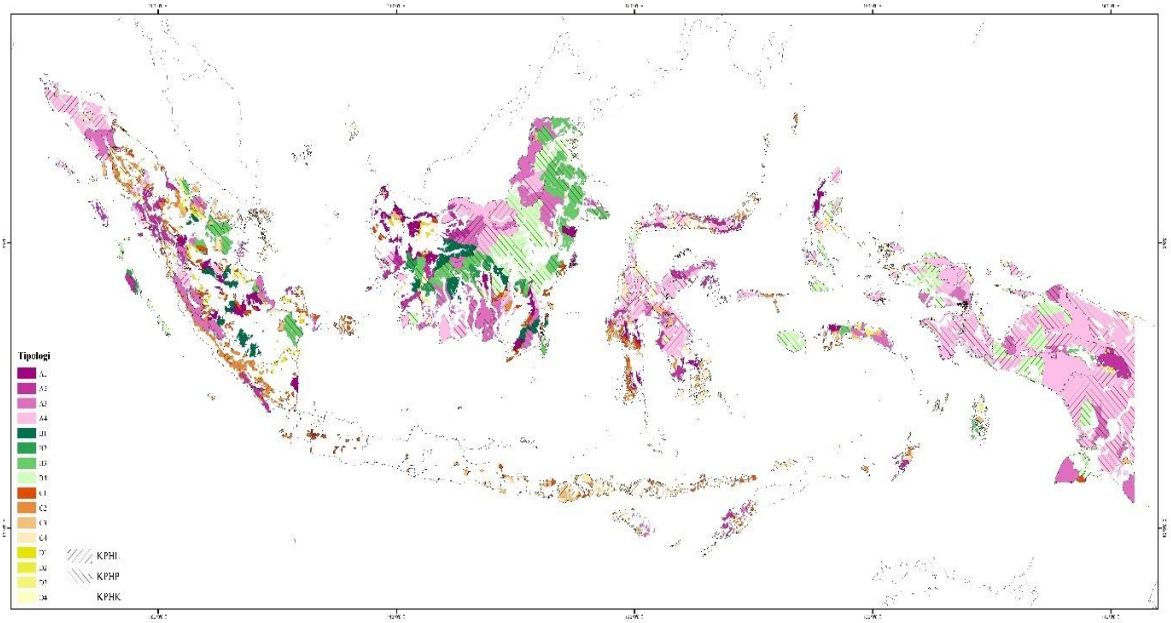


Figure 7. Typology of FMUs based on condition of resources, social capital and institutional capacity

Based on the FMU area in **Table 10** it is identified that most of the FMU units have typology type A4 with the widest distribution being in the provinces of Papua and West Papua. This condition indicates that the FMUs in the 2 provinces generally have an area greater than 100,000 ha, the permit burden is less than 50% with the type of private management, namely low social capital and weak institutions. Seeing this condition, it is

necessary to strengthen efforts both in terms of institutions and social capital in order to increase the capacity of FMUs at the site level.

Referring to the institutional typology, the FMU management model included in Typology 1 with strong social capital and institutional capacity ideally follows the community forest management model with a partnership pattern (A1, …, D1). Typology 2 where social capital is strong while institutional capacity is low can develop a community-based forest management model; A2, ….D2). Typology 3, where social capital is low while institutional capacity is strong, can develop a public management model (Managed by Government; A3, …, D3). Meanwhile, Typology 4 with low social capital and low institutional capacity should ideally develop a management model using a contract system or hand over forest management concessions to the private sector – individuals, companies, or cooperatives (Managed by Business; A4, …, D4).

Table 10. Number of area management units (KPHL, KPHP, Conservation) by institutional typology per province

Province	Type of Institutional Typology																Total
	A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4	D1	D2	D3	D4	
Aceh	-	-	1	8	-	-	-	-	-	3	3	3	-	-	-	-	18
Bali	-	-	-	-	-	-	-	-	3	-	-	5	-	-	-	-	8
Bangka-belitung	-	1	1	-	-	-	-	-	11	2	-	-	2	-	-	-	17
Banten	-	-	-	-	-	-	-	-	1	4	2	-	-	-	-	-	7
Bengkulu	-	1	1	-	-	-	-	-	12	22	4	-	-	-	-	-	40
Special Region of Yogyakarta	-	-	-	-	-	-	-	-	5	2	-	-	-	-	-	-	7
DKI Jakarta	-	-	-	-	-	-	-	-	-	1	-	2	-	-	-	-	3
Gorontalo	-	1	-	3	-	-	-	-	-	2	1	7	-	-	-	-	14
Jambi	3	-	3	-	8	-	1	-	9	4	2	1	3	-	2	-	36
West Java	-	-	-	1	-	-	-	-	26	5	3	1	-	-	-	-	36
Central Java	-	-	-	-	-	-	-	-	28	1	4	2	-	-	-	-	35
East Java	-	-	-	-	-	-	-	-	10	4	8	-	-	-	-	-	22
West Kalimantan	9	7	5	6	8	1	1	1	4	-	2	3	3	-	-	2	52
South Kalimantan	6	-	2	-	2	-	3	-	7	1	3	-	-	-	-	-	24
Central Kalimantan	1	-	12	9	3	6	6	10	4	-	3	2	-	-	2	-	58
East Kalimantan	1	-	5	9	-	-	9	10	4	-	4	1	-	-	-	-	43
North Kalimantan	-	-	4	2	-	-	6	5	-	-	2	1	-	-	-	-	20
Kepulauan Riau	-	-	-	-	-	-	-	-	4	-	-	3	-	-	-	-	7
Lampung	1	1	-	-	-	-	-	-	6	12	1	-	-	3	-	-	24
Maluku	1	1	3	-	-	-	2	3	6	7	8	3	-	-	3	-	37
North Maluku	2	-	-	3	-	-	-	3	1	5	-	6	-	-	-	2	22
West Nusa Tenggara	-	-	-	-	-	-	-	-	24	1	4	3	-	-	-	-	32
East Nusa Tenggara	-	-	-	-	-	-	-	-	24	5	9	8	-	-	-	-	46
Papua	-	1	4	63	-	-	-	-	3	-	4	5	-	-	-	-	80
West Papua	-	-	2	18	-	-	-	6	5	3	2	9	-	-	-	-	45
Riau	4	2	4	1	1	-	5	-	12	11	12	4	2	-	2	1	61
West Sulawesi	-	1	-	3	-	-	-	-	-	8	-	7	-	-	-	-	19
South Sulawesi	4	1	3	3	-	-	-	-	8	6	3	1	-	-	-	-	29
Central Sulawesi	-	3	2	17	-	-	-	1	1	2	3	12	-	-	-	1	42
Southeast Sulawesi	1	3	-	12	-	-	-	-	1	5	5	15	-	-	-	-	42

Province	Type of Institutional Typology																Total
	A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4	D1	D2	D3	D4	
North Sulawesi	-	3	-	1	-	-	-	-	1	8	1	2	-	-	-	-	16
West Sumatra	-	8	2	3	-	1	-	1	6	8	4	6	-	1	-	-	40
South Sumatra	4	-	3	-	4	-	2	-	4	16	3	-	-	4	4	-	44
North Sumatra	-	8	1	4	-	-	-	1	8	23	1	14	-	3	-	1	64
Total	**37**	**42**	**58**	**166**	**26**	**8**	**35**	**41**	**238**	**171**	**101**	**126**	**10**	**11**	**13**	**7**	**1090**

Table 11. Distribution of area managers (KPHL, KPHP, Conservation) by institution typology per province (in hectare)

Province	Unit																Total (Ha)
	A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4	D1	D2	D3	D4	
Aceh	-	-	628,064	2,478,569	-	-	-	-	-	2,400	97,703	85.269	-	-	-	-	3.292.005
Bali	-	-	-	-	-	-	-	-	1,994	-	-	109.189	-	-	-	-	111.183
Bangka-belitung	-	49,304	84,632	-	-	-	-	-	333,819	37,388	-	-	108.797	-	-	-	613.940
Banten	-	-	-	-	-	-	-	-	32,462	66,879	12	-	-	-	-	-	99.352
Bengkulu	-	62,348	341,757	-	-	-	-	-	1,639	434,971	7,216	-	-	-	-	-	847.930
Special Region of Yogyakarta	-	-	-	-	-	-	-	-	18,168	1,071	-	-	-	-	-	-	19.238
DKI Jakarta	-	-	-	-	-	-	-	-	-	25	-	19	-	-	-	-	44
Gorontalo	-	88,845	-	219,900	-	-	-	-	-	107,258	101	319.895	-	-	-	-	735.999
Jambi	222,382	-	577,726	-	486,376	-	97,892	-	256,669	91,020	18,690	54.792	93.931	-	175.555	-	2.075.031
West Java	-	-	-	34,555	-	-	-	-	156,381	13,410	528	424	-	-	-	-	205.298
Central Java	-	-	-	-	-	-	-	-	12,547	104	1,980	60.600	-	-	-	-	75.231
East Java	-	-	-	-	-	-	-	-	26,060	40	139,904	-	-	-	-	-	166.004
West Kalimantan	1,144,490	1,153,043	908,162	1,770,890	1,076,981	254,003	332,348	151,289	171,221	-	91,748	38.518	193.367	-	-	111.093	7.397.153
South Kalimantan	287,885	-	377,814	-	360,208	-	222,242	-	232,521	250	8,014	-	-	-	-	-	1.488.934
Central Kalimantan	112,576	-	2,277,191	1,873,331	450,511	724,434	1,261,080	1,554,734	50,064	-	45,923	65.731	-	-	69.017	-	8.484.591
East Kalimantan	191,499	-	1,116,436	991,352	-	-	2,734,611	2,428,044	130,217	-	108,334	4.787	-	-	-	-	7.705.280
North Kalimantan	-	-	1,968,895	765,773	-	-	1,347,654	1,681,541	-	-	54,332	34.827	-	-	-	-	5.853.022
Kepulauan Riau	-	-	-	-	-	-	-	-	102,125	-	-	168.584	-	-	-	-	270.710
Lampung	127,892	255,322	-	-	-	-	-	-	102,914	350,744	1,383	-	-	93.171	-	-	931.426
Maluku	140,987	131,111	499,360	-	-	-	258,133	589,257	62,325	125,224	348,415	174.481	-	-	224.664	-	2.553.956
North Maluku	265,819	-	-	451,055	-	-	-	545,354	6,314	119,208	-	200.811	-	-	-	163.137	1.751.698
West Nusa Tenggara	-	-	-	-	-	-	-	-	886,476	1,823	70,204	87.250	-	-	-	-	1.045.753
East Nusa Tenggara	-	-	-	-	-	-	-	-	1,145,939	12,111	74,978	115.415	-	-	-	-	1.348.443
Papua	-	784,318	1,370,029	22,702,160	-	-	-	-	68,878	-	124,074	57.258	-	-	-	-	25.106.718
West Papua	-	-	489,215	4,647,453	-	-	-	1,095,247	462,783	3,027	31,413	441.905	-	-	-	-	7.171.044
Riau	266,990	107,167	542,825	109,741	99,197	-	1,123,892	-	314,959	383,676	413,799	166.086	192.560	-	237.401	42.036	4.000.329
West Sulawesi	-	156,216	-	362,109	-	-	-	-	-	239,316	-	239.825	-	-	-	-	997.466
South Sulawesi	362,344	107	383,870	457,490	-	-	-	-	379,305	187,762	70,663	28	-	-	-	-	1.841.569
Central Sulawesi	-	435,485	288,169	2,339,364	-	-	-	103,602	10,081	7,781	13,213	399.689	-	-	-	90.992	3.688.376
Southeast Sulawesi	116,118	348,030	-	1,050,144	-	-	-	-	6	140,435	59,673	542.256	-	-	-	-	2.256.660
North Sulawesi	-	281,187	-	178,107	-	-	-	-	7,224	204,873	209	3.362	-	-	-	-	674.962
West Sumatra	-	742,003	345,312	312,341	-	117,888	-	131,204	75,785	192,230	39,603	147.834	-	46.210	-	-	2.150.411
South Sumatra	497,392	-	443,487	-	544,738	-	609,961	-	143,089	537,064	176,955	-	-	119.401	108.470	-	3.180.556
North Sumatra	-	833,382	202,037	354,934	-	-	-	99,805	122,467	863,819	12,270	251.333	-	77.044	-	86.524	2.903.617
Total	**3,736,372**	**5,427,867**	**12,844,984**	**41,099,269**	**3,018,010**	**1,096,325**	**7,987,812**	**8,380,077**	**5,314,431**	**4,123,911**	**2,011,333**	**3.770.168**	**588.655**	**335.825**	**815.107**	**493.782**	**101.043.928**

3.3. Map of Biogeophysical Index (IBGF)

The Biogeophysical Index map (IBGF) was developed based on the Minister of Environment and Forestry Regulation Number P.70/MENLHK/SETJEN/KUM.1/12/2017 on the Implementation of Reducing Emissions from Deforestation and Forest Degradation, Role of Conservation, Sustainable Management of Forest and Enhancement of Forest Carbon Stocks. In this case, IBGF is organised into three (3) types, namely IBGF for Emission, Absorption and Fire.

1) **IBGF Emission** are determined based on the historical deforestation rate (Historical Emission Index, IEH) and the current percentage of natural forest cover remaining in the area (Forest Cover Index/ITH). Areas that have the highest IBGF Emission rankings are areas with high rates of past deforestation (historical emissions) while the area fraction that is still natural forest is already very low. This means that areas where IBGF Emission have the first rank will have a very high risk of losing natural forest in the not too distant future or can be said to have a very high level of emission risk. In this area, the existence of drivers of deforestation is already very high so it is necessary to get priority to address the driving factors. On the other hand, in areas with low IBGF Emission ranking.
2) **IBGF Absorption** is determined based on the trend of changes in the area of historical non-productive land (ILNP) and the current percentage of non-productive land cover in the area (Non-productive cover index; ITNP). The area that has the highest IBGF Absorption ranking is an area where the trend of changes in non-productive land area tends to increase and the area of non-productive land is currently very high (>75%). This means that the area where IBGF Absorption has the first rank will have a very high absorption potential.
3) **IBGF Fire** describes the level of vulnerability or ease of an area affected by fire which is determined based on the presence of historical hotspots and biophysical conditions. IBGF Fire in principle determine the level of vulnerability of the area to fires based on the proximity of the area to the triggering factors or drivers of fires between proximity to roads, settlements, the presence of peat and others.

Each index is divided into three classes, namely low, medium and high each having a score of 1, 2 and 3. Specifically for IBGF Emission and Fire, it has a score of 0 for areas that no longer have forest and do not have fire problems. The integration of the three index values is expressed as the Location Priority Index (IPL).

$$IPL = IBGFemission + IBGFabsorption + IBGFfire$$

The IPL value ranges from 1 to 9, the higher the IPL value the higher the level of urgency or priority of the location to be used as a target location for programme implementation, as described in **Table 12** and **Figure 8**.

Table 12. Grouping of priority locations for the implementation of forest management programmes and activities based on IPL values

Priority	IBGF1 Emission	IBGF2 Absorption	IBGF3 Fire	IPL	Description
Extreme High	3	3	3	9	Area of this group has very low natural forest cover but the threat of deforestation is very high, non-productive land is extensive and tends to increase and the problem of fires is very high
Very High	3	3	2	8	
	3	2	3	8	
	2	3	3	8	
High	3	3	1	7	Areas of this group generally have very low natural forest cover with a very high threat of deforestation, large areas of non-productive land and high fire problems
	3	2	2	7	
	3	1	3	7	
	2	3	2	7	Areas of this group generally have a fairly high natural forest cover with moderate deforestation threats, very large non-productive lands and very high fire problems
	2	2	3	7	
	1	3	3	7	
Moderate High	3	3	0	6	Areas of this group generally have low natural forest cover with a high threat of deforestation, generally large areas of non-productive land, relatively low fire problems
	3	2	1	6	
	3	1	2	6	
	2	3	1	6	Areas of this group generally have quite high natural forest cover with moderate to high deforestation threats, large areas of non-productive land and generally still have high fire problems
	2	2	2	6	
	2	1	3	6	
	1	3	2	6	
	1	2	3	6	
	0	3	3	6	There is no natural forest, extensive non-productive land and tends to increase and the problem of fires is very high
Moderate	3	2	0	5	Areas of this group generally still have a low to moderate percentage of natural forest cover with a relatively high threat of deforestation, moderately non-productive land and relatively low fire problems
	3	1	1	5	
	2	3	0	5	
	2	2	1	5	
	2	1	2	5	
	1	3	1	5	Areas of this group generally still have a high percentage of natural forest cover with low deforestation threats, moderate non-productive land and moderate to high fire problems
	1	2	2	5	
	1	1	3	5	
	0	3	2	5	No natural forest, non-productive land and high fire problem
	0	2	3	5	
Moderate Low	3	1	0	4	Areas of this group generally still have high natural forest cover with the threat of deforestation generally low to moderate, non-productive land is relatively moderate and the problem of fires is generally very low
	2	2	0	4	
	2	1	1	4	
	1	3	0	4	
	1	2	1	4	
	1	1	2	4	
	0	3	1	4	There is no natural forest, relatively moderate non-productive land and the fire problem is generally moderate
	0	2	2	4	
	0	1	3	4	
Low	2	1	0	3	This area has very high natural forest cover, the threat of deforestation is generally very low, non-productive land is small & fires are very low
	1	2	0	3	
	1	1	1	3	
	0	3	0	3	No natural forest, relatively moderate non-productive land and low fire problems
	0	2	1	3	
	0	1	2	3	
Very Low	1	1	0	2	This area has very high natural forest cover, very low threat of deforestation and no fire problems
	0	2	0	2	
	0	1	1	2	

Priority	IBGF1 Emission	IBGF2 Absorption	IBGF3 Fire	IPL	Description
Extreme Low	0	1	0	1	Has no natural forest cover, non-productive land is low and tends to decline, fire problems are almost not-existent

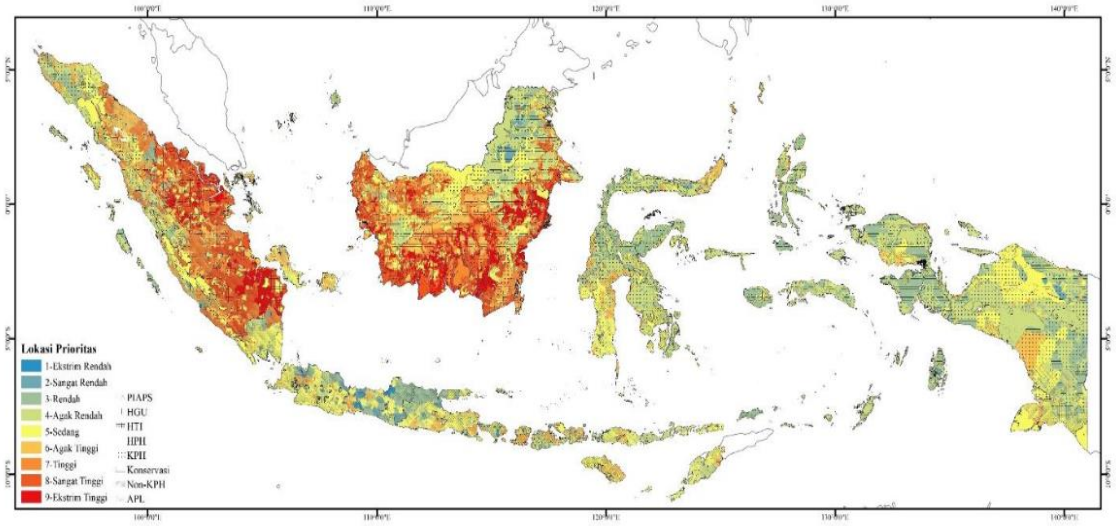


Figure 8. Map of priority areas for FMUs (KPHP, KPHL, KPHK and KPHK non-National Park) for the implementation of mitigation actions based on IBGF

As described in Table 10, the Location Priority Index (IPL) can be used as a guide to determine priority locations for the implementation of forest area management programs. Spatial information on the distribution of natural forest in each management unit accompanied by IPL information provides information on the threat level of areas that are still in natural forest and will experience deforestation. This information can be used as a guide in determining priority areas for dealing with deforestation problems and potential synergies with other area management activities. The distribution of natural forested areas according to IPL can be seen in Table 13 and Figure 9**.**

Table 13. Area distribution of natural forests (ha) in each management unit by IPL

IPL	APL[1]	HGU[2]	Conservation[2]	KPH[1]	PBPH-HA[2]	PBPH-HT[2]	PBPH-RE[2]	PIAPS[2]	Non-KPH
ET(9)	357,984	62,627		88,198		5,726		10,278	50,229
ST(8)	325,392	118,349	162,666	378,010	83,627	342,057	136,178	163,117	146,365
T(7)	318,726	81,164	147,396	1,420,446	842,351	298,478	191,009	177,008	9,101
AT(6)	893,387	219,169	606,427	3,114,358	2,200,493	598,381		401,904	307,987
S(5)	2,174,813	96,176	1,224,578	7,691,543	1,224,808	465,257		1,430,592	1,159,644
AR(4)	1,021,845	234,645	1,069,985	15,795,663	3,742,647	409,149	95,123	1,544,334	2,155,813
R(3)	1,068	81,774	7,409,166	4,626,548	6,939,358	706,980		1,474,606	472,950
SR(2)	468	18,846	5,928,046	238,153	675,168	84		112,650	4,236
ER(1)	6038		1,020					2,857	2,049
Total Forest[3]	5,094,267	912,750	16,549,284	33,352,918	15,708,452	2,826,113	422,310	5,317,346	4,308,377
Total Area[4]	56,998,041	10,316,689	20,829,476	41,411,762	17,808,018	10,271,558	519,290	10,259,493	10,530,630
Forest (%)	9.2	8.85	79.45	80.54	88.33	27.51	81.33	51.83	40.91

Note: [1] The area does not include the area that has been burdened with a permit; [2]Area of priority based on IPL of each management unit; what is termed PBPH is PBPH-HTI. The data is the result of image interpretation processing. ET (Extremely High), ST (Very High), T (Tinggi/High), AT (Moderately High), S (Moderate), AR (Moderately Low), R (Low), SR (Very Low), ER (Extremely Low) [3] Forest area includes primary dry forest area, secondary dry land forest, primary mangrove, secondary mangrove, primary swamp forest, [4]Total terrestrial area inside and outside the forest area (excluding water)

Furthermore, spatial information on the distribution of non-productive land in each management unit accompanied by IPL information provides information on the level of prioritisation of non-productive land areas for the implementation of activities to increase carbon stocks (carbon sequestration) and potential synergies with activities to deal with threats of deforestation and land fires. The distribution of non-productive land according to IPL can be seen in **Table 14** and **Figure 10**.

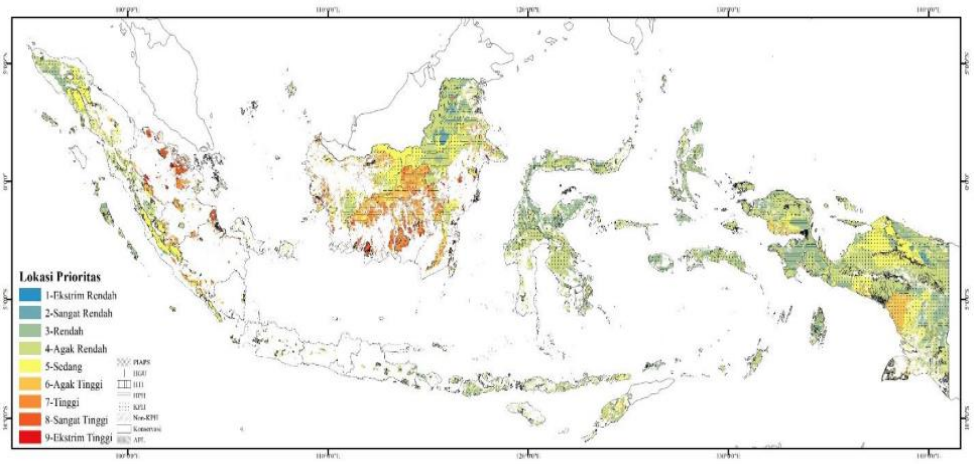


Figure 9. Map of priority locations for FMUs (KPHP, KPHL, KPHK and non-TN KPHK) in forested natural forest areas in each management unit

Note: coloured areas are natural forested areas according to the priority level

Table 14. Distribution of Indonesia's non-productive area (ha) by IPL and managers

IPL	APL[1]	HGU[2]	Conservation	KPH[1]	PBPH-HA[2]	PBPH-HT[2]	PBPH-RE	PIAPS[2]	Non-KPH
ET(9)	1,568,529	253,582		26,040		66,465		13,296	131,662
ST(8)	1,163,774	282,663	456,147	545,199	28,404	737,399	25,468	328,596	306,743
T(7)	1,040,711	121,921	101,421	287,040	168,214	436,446	45,179	165,750	29,989
AT(6)	1,464,485	306,103	184,528	455,145	226,721	307,081		268,454	42,987
S(5)	2,174,169	154,879	966,975	948,267	210,462	459,455	1,719	392,268	892,626
AR(4)	357,490	102,632	173,997	1,070,844	304,577	236,929		555,243	442,493
R(3)	67,372	42,964	677,776	450,342	327,474	175,796		251,979	121,739
SR(2)	6,599	12,893	264,586	249	631	9,357		7,911	184
ER(1)	1,425	2,569	2,469					139	1,740
Total Forest[3]	7,844,754	1,280,207	2,829,042	3,783,126	1,266,482	2,428,928	72,365	1,983,636	1,970,161
Total Area[4]	56,998,041	10,316,689	20,829,476	41,411,762	17,808,018	10,271,558	519,290	10,259,493	10,530,630
Forest (%)	14.06	12.41	13.58	9.14	7.14	23.65	13.94	19.33	18.71

Note: [1] Area does not include licenced areas; [2]Total area of priority location based on each IPL on each management unit; note that PBPH is PBPH-HT. Data obtained from analysis of landsat interpretations.

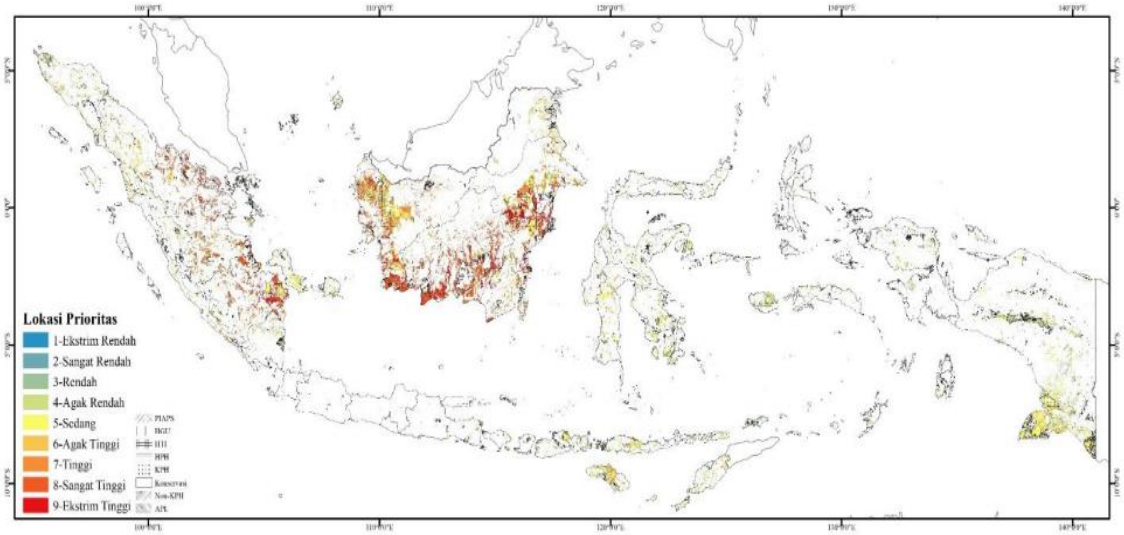


Figure 10. Map of priority areas for FMUs (KPHP, KPHL, KPHK and non-TN KPHK) in non-productive areas in each management unit
Note: coloured areas are non-productive areas according to the priority level

CHAPTER IV
OPERATIONAL PLAN FOR GREENHOUSE GAS EMISSIONS REDUCTION FOR FORESTRY AND LAND SECTOR 2030

In order to achieve the Indonesia's FOLU Net Sink 2030 target, corrective steps and plans that are coherent with development are needed. As already explained, corrective steps are taken not only to align environmental and forestry policy directions with the SDGs and ensure the utilisation and use of forest areas that apply the principles of environmental carrying capacity, but also to ensure that programme implementation has a positive impact. This will significantly reduce the rate of deforestation and forest degradation while reducing the incidence of forest and land fires, as well as contributing to the success of global co-operation in dealing with climate change through NDC commitments by reducing Greenhouse Gas Emissions (GHG).

The spatial-based planning used in determining the locus of the operational plan for reducing GHG in the forestry and land sector is intended for all implementing organizations of the Ministry of Environment and Forestry (Echelon I, Echelon II, and UPT) and their partners (local government, private sector, organizations, community, customary law community) with the principle that one location of KLHK programmes and activities can be carried out jointly by multi-implementing organizations, multi-budgets, and multi-activities.

The use of the three spatial informations as previously explained is very necessary in the process of determining the direction for implementing spatial-based mitigation actions at the site level. Equipped with other thematic spatial information, the three spatial information (templates) can provide direction for determining priority locations for the implementation of various programmes and actions in a more integrated manner at the site level, so that corrective measures can be implemented effectively and contribute significantly to the reduction of GHG.

4.1. Determination of Directional uses for Implementation of Mitigation Actions

Determination of directions for the implementation of mitigation actions using the three spatial information (templates) in addition to providing directions for priority locations, also provides some information needed to build synergy and integration of programmes and activities across organizations within the Ministry of Environment and Forestry. Areas with a very high IPL have a very high risk of deforestation, forest degradation and fires. If the implementation of programmes and activities, by implementing organizations, is not directed at this area in a synergistic manner, then the risk for emission will be very high especially as a result of unplanned (illegal) deforestation and degradation.

Efforts to protect the forest in this area will also be absolutely vital to ensure the sustainability of ecosystem/environmental services if it is known that the direction for optimising their use based on the Environmental Services Index (IJLH) is included in the directional use of protection or rehabilitation. On the other hand, the area of unproductive land in this area tends to continue to increase, this condition indicates high tenure problems and uncontrolled encroachment activities.

Conflict resolution programmes and providing access to management are key activities that need to be carried out in this area with the involvement of the community and other parties through empowerment programmes, economic activities, and ecosystem restoration. The existence of strong institutions at the site level plays a major role in facilitating and building partnerships with other parties for the implementation of programmes and activities, which will determine the success of programmes and activities.

Echelon I Working Units of the MoEF as area stakeholders who are directly related to forest area management using spatial information on area conditions, optimisation directional use based on IJLH and Location Priority Index (IPL) will be able to set targets, programmes and priority activities/actions. Based on the area's land cover information which is integrated with IPL and IJLH information, some information can be generated that can be used in providing direction for determining priority locations. The process of determining priority locations for the implementation of mitigation actions using spatial information is as follows:

a. *Prevention of Deforestation and Degradation (DD) of Natural Forests*
   The priority locations for the implementation of this mitigation activity are in areas that still have natural forest cover with a relatively high IPL and based on IJLH including protection and production directives. Locations with high IPL have a high risk of being converted to non-forest or degraded. The location is still natural forest which is included in the direction of protection and production, and must be maintained to ensure the continuity of the forest providing environmental services and forest products.
b. *Concession Forest Degradation*
   In the concession area, most of the area is still in the form of primary natural forest. Prevention of primary to secondary forest degradation in forest concession areas is one of the mitigation actions.
c. *Plantation Forest Development*
   The priority location is to increase the development of industrial forest plantations in meeting the needs of industrial timber by reducing dependence on natural forests in the PBPH-HT concession area and the PIAPS area which is included in the IJLH production direction. The implementation of plantation forest development is in unproductive areas that are going in the direction of production. Rehabilitation of the existing unproductive land is used for non-rotational rehabilitation. Plantation forest development can also be in the form of natural forest and ecosystem restoration.
a. *Sustainable Forest Management (PHL).*

Priority locations for the implementation of PHL activities are forest enrichment activities (Enhanced Natural Regeneration [ENR]), and low impact cutting-technology (RIL-C) in concession areas. Both PBPH-HA and PBPH-HT. ENR activities are directed at a real concession whose land cover is in the form of natural forest. These fall under the directional uses of conservation and rehabilitation, including secondary forest moving in the directional use of production. SILIN implementation includes ENR kegiatan activities because these could increase productivity of natural forest up to 3–4 times from productivity moment; this or equivalent with 90–120 m^3/ha/cycle. Meanwhile, RIL-C activities are directed at concession areas whose land cover is still primary forest which is included in the production directional use.

b. *Increased Carbon Stock (PCK)*.

Activities to increase forest carbon stocks are land rehabilitation activities through planting trees that can be harvested for wood (rotation) and wood that is not harvested (non-rotational). For rotational rehabilitation, priority locations are areas with relatively high IPL, where the land cover is unproductive; seasonal cultivation areas and plantations that are included in the production direction and are located in production forest areas and not peatlands. When rehabilitation activities are without rotation then priority locations are areas with relatively high IPL. This land cover is unproductive with seasonal cultivation lands and plantations that are included in the protection direction for areas within production forest areas and forest areas; protected forest as well as no peatland. Rehabilitation activities with land cover in the form of cultivated land and plantations, namely in the form of *agroforestry* activities, in *accordance* with the Regulations Government Number 23 of 2021 concerning Implementation of forestry.

c. *Peatland Management*.

Deep peatland management activities, in order to reduce emissions from peat decomposition and fires, namely improving water management and restoration in peatland areas whose IPL is also relatively high, to improve peat water management. Priority is given to concessions and HGU areas whose land cover has become plantation forests and plantations, while restoration activities are directed at unproductive land, cultivation and plantations are located in all area functions and all directions. Restoration activities, in areas that have been used for seasonal cultivation activities and plantations outside the concession, are directed to restore the function of peat by developing a paludiculture cultivation pattern and other possible silvicultural techniques based on technological developments. Meanwhile, for areas with unproductive land cover, it is directed to restoration activities that can encourage or accelerate natural regeneration of nature in or by artificial means with enrichment.

d. *Natural Forest Conservation*.

Natural forest conservation outside the Conservation Forest Area is carried out to maintain high conservation value areas. Likewise, in forest areas, it is done by maintaining areas of high conservation value. Based on the IJLH, natural forested areas that become conservation areas are areas that are included in the protection directional use.

Areas that fall into the relatively high priority category are those with an IPL value of 7 to 9 and those in the moderate category have IPL values of 5 and 6, and the low ones with IPL values of 1 to 4, are a target to be achieved. A lower IPL can be chosen if the available land area in the high IPL area is not sufficient to achieve the NDC target and Indonesia's FOLU Net Sink 2030. The distribution of the area for the implementation of the mitigation action to each stakeholder is in a relatively high priority area (IPL 7-9) is presented in **Table 15** It should be noted that **Table 15** has not included mitigation actions through mangrove RHL which is a new substance

that is being intensified by the Government, in the development of the RENOP, it will be analysed in more detail.

Based on the value of the high-extreme-high Priority Location Index (IPL 7-9), the area for implementing mitigation actions in an effort to achieve the 2020-2024 NDC target is still insufficient for several mitigation activities, especially the development of PBPH-HT (**Table 15**). Meanwhile, for the implementation of sustainable forest management activities, ENR and RIL rehabilitation (rotational and non-rotational) and peat management, both water management and restoration, have exceeded the NDC and LTS targets. Furthermore, the area of natural forest with a high level of deforestation risk (IPL 7-9) reaches more than 2.78 million hectares. While the NDC target and net sink; the cumulative area that can be deforested from 2013 to 2024 and 2030 is 5.11 million ha and 7.26 million ha for NDC, and 3.142 million ha and 4.22 million ha for LTS, respectively. In order to achieve the Indonesia's FOLU Net Sink target, there is no room for deforestation until 2030. Forest protection in the IPL 7-9 area is estimated as not sufficient to meet the net sink target towards zero deforestation. Efforts to protect the natural forest must be expanded to the region with an IPL of 5-6. However, forest protection activities for the period 2021-2024 can be directed first at IPL 7-9 areas with a total area of 2.78 million ha.

Table 15. The area of the implementation of the mitigation action program according to area holder on IPL 7, 8 and 9 (2021-2024) (in hectare)

Area Manager	Management Type	Deforestation		Concession degradationsi	PBPH-HT[3]	PHL		Enhamcement of Carbon Stock		Peatland Management		High Conservationi[3]
		Mineral	Peatland			ENR[3]	RIL-C[3]	Rotatioal	Non-rotational	Tata Air[3]	Restoration	
DG of PHL	HP-Non Konsesi	245,657	183,704			1,806		88,457	215,842		13	11,095,028
	HPK-HP	145,372	60,659			1,881		304,044	123,972		1,486	840,150
	KPHP-HTI	199,936	199,659	402,222	1,346,427	1,201,355	192,367	2,106,325	971,734	718,021	506,024	1,443,708
	KPHP-HPH	53,778	77,641	5,444,456		5,881,374	4,380,996	1,519,486	320,782		129,751	5,460,254
	KPHP-RE	147.384	9.478	84.277		6.257		23.987	43.052		26,852	360,930
DG of PDASRH	HL-Non PIAPS	46.056	22.670			30			92.711		-	14,128,824
DG of KSDAE	KONSERVASI	177.732	131.885			444			638.548		9,351	
DG of PSKL	KPHL-PIAPS	11.943	12.577			100			29.000		43,593	1,459,031
	KPHP-PIAPS	126.803	89.867		116.041	2.531		38.869	168.036		200,624	1,750,410
DG of PPKL[4]	GAMBUT										40,749	
BRGM[5]	BRGM										1,070,689	
PEMDA	PEMDA-Non HGU	552.267	117.857					1.230.100	85.070			1,350,742
	PEMDA-HGU	116.701	56.465					221,820	33,488	956,682	116,940	440,472
TOTAL		**1,823,630**	**962,461**	**5,930,955**	**1,462,467**	**7,095,778**	**4,573,363**	**5,533,087**	**2,722,236**	**1,674,703**	**2,146,059**	**38,329,548**
TARGET of NDC 2024[1]		5,056,451	55,617	N,A	9,307,332	1,589,494		2,422,563	1,453,538	863,914	977,034	
TARGET of NDC 2030[1]		7,195,913	75,321	N,A	11,227,332	3,105,817		3,460,804	2,076,482	863,914	1,395,763	
TARGET of LTS 2024[2]		2,954,287	187,854	1,705,000	9,307,332	1,413,203		1,951,493	1,756,344	785,439	1,996,762	
TARGET of LTS 2030[2]		3,973,232	252,645	2,282,500	11,227,332	2,207,061		2,787,847	2,509,062	946,050	2,724,866	

Note: The figures listed in the table are in hectares1. Calculated based on the NDC and [2]LTS-LCCP targets (KLHK, 2021), the values show the cumulative targets since 2011 (except for deforestation and forest degradation, in which the cumulative value is since 2013) and have not been corrected for the actual historical values of 2013- 2020, the target area for enhancingg carbon stock and pealand restoration activities has not been multiplied by the survival rate; [3]Areas for forest degradation prevention, HTI development, implementation of sustainable forest management (PHL) and peat water management in concession areas (PBPH-HT and HGU) are located in all IPL (1-9); [4]Based on Presidential Decree 92 of 2020 and Minister of Environment and Forestry No. 15 of 2021, the management of HL is carried out by the Directorate General of PHL; [5]PPKL as a stakeholder in the implementation of restoration activities outside forest areas or Other Land Uses (APL) areas that are not classified as HGU; [6]BRGM as the implementing stakeholder for peatland restoration activities in seven provinces (Jambi, Riau, South Sumatra, West Kalimantan, Central Kalimantan, South Kalimantan, and Papua) which are located outside the concessions in all forest area functions, while for other provinces, remained within the jurusdiction of each regional stakeholder.

The total area in the area available for the implementation of PBPH -HTI development activities in the very low-extreme high priority location index (IPL 1-9) is 1.46 million hectares. Then seen from the target of PBPH-HT development in NDC and LTS, in the period 2021-2030, is to reach 11.2 million hectares. This value is still far from sufficient to reach net zero emissions (NZE) in 2030. The achievement of plantation forest development targets in accordance with NDC or LTS targets can be done through synergy with rehabilitation programmes with rotation.

To build programme synergies between the Ministry of the Environment and Forestry in priority areas needs to pay attention to institutional typology. The Management Units with typologies 1 and 3 generally have high institutional capabilities (see **Figure 7**) so they are expected to be able to coordinate and build synergies between programmes from various organizations at the site level. Meanwhile, in priority areas where the Management Unit has typologies 2 and 4, institutional capacity is still low, so it is necessary to carry out institutional strengthening activities.

4.2. Determination of Target Locations for Implementation of the Operation Plan

Implementation of organizational programmes and activities within the Ministry of Environment Life and Forestry as a form of corrective action, must be sure it can contribute significantly to reducing the rate of deforestation, forest degradation, forest and land fires (Karhutla), as well as increasing the rate of land rehabilitation and implementing sustainable forest and peat resource management systems in line with the target. NDC thorough approach Indonesia's FOLU Net Sink 2030 as presented in **Table 15**. Determining the types of programmes and activities need to pay attention to land cover conditions and optimisation directions as well as the level of urgency of their implementation in accordance with the magnitude of the threat of deforestation, forest degradation and fires described by the location priority index or IPL.

The existence of a spatial template is very much needed in the process of prioritising locations and integrating spatial-based programmes and activities down to the site level, so that corrective measures can be implemented effectively. The formation of the programme includes prevention of deforestation and degradation (DD) of natural forests, degradation of concession forests, development of plantation forests, sustainable forest management (PHL), enhancement of carbon stocks (PCK), management of peatlands, and conservation of natural forests. The flow of targeting, priority programmes and activities for the achievement of NDC targets based on the direction of area optimisation, and the type of land cover in the area as a whole can be seen in **Figure 11**.

In determining priority locations, it is necessary to pay attention to the wide availability of needs required for the implementation of the action. To achieve the target, the implementation of these actions is focused on areas with an extreme high priority location index (IPL 9). However, when the area in IPL 9 is insufficient to achieve the target; it can be continued on IPL 8, 7, and so on. This really depends on the urgency of the implementation of the mitigation actions to be achieved by the respective Ministries/Institutions concerned. Furthermore, an explanation of the distribution of locations by province and district to the site in more detail will be explained in the next sub-chapter.

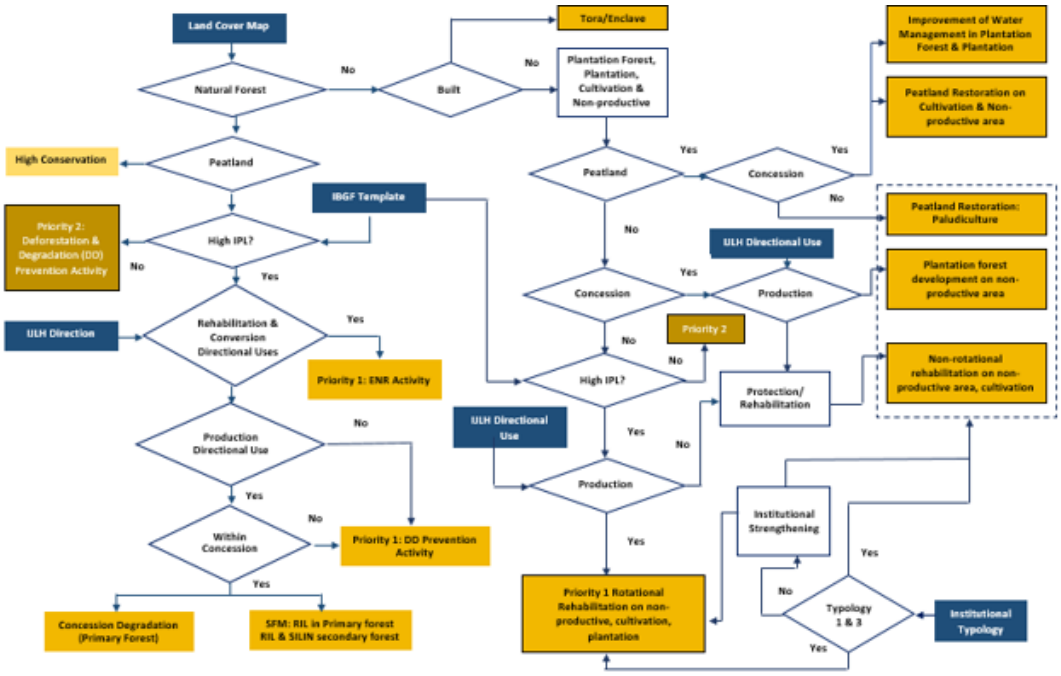


Figure 11. Flow template for determining priority locations for the implementation of mitigation actions

4.2.1. Prevention/Reduction of Forest Deforestation Rate

Deforestation prevention programmes are one of the important priorities for all regional stakeholders. The implementation of programmes and activities to reduce deforestation is focused on areas that are at high risk for deforestation. In detail, the distribution of the implementation area of the deforestation prevention programme among all stakeholders, according to the Location Priority Index (IPL), by taking into account the emission risk level or biogeophysical index in all area functions up to the site level is explained as follows.

4.2.1.1. Production Forest Area

Production forest as its function aims to produce timber and non-timber forest products as well as environmental services which in its management must prioritise sustainable production forest management. Several main aspects that need to be considered to ensure the sustainability of production forest management include aspects of certainty and security of forest resources, production sustainability, conservation of flora and fauna and biodiversity as well as various lines of forest function for the environment.

Deforestation should be a concern in this area. Most of the deforestation in Indonesia occurs in production forest areas, which is thought to be due to free access or open access. Production forest management activities are important in terms of mitigating deforestation. A high open access area within the production forest, indicates that the area is vulnerable to deforestation. This condition requires the working units within the MoEF, to determine the policy direction and implementation of the programme in the right production forest area by adhering to the principles of sustainability in its management (sustainability of production, ecological and social functions). The use of the spatial template described above can be used to provide direction for the location of sustainable production forest implementation by taking into account the level of risk and its typology.

The area in the production forest area that still has natural forest cover reaches 40.7 million hectares, and most of it is in the provinces on the islands of Kalimantan and Papua (**Table 16**). Nearly 50% of the production forest area has been granted a forestry business permit or has become a concession. Based on the IBGF analysis, around 1.53 million hectares of this forest falls into areas with high deforestation risk (IPL 7-9). Around 40.70% are natural forest areas located on peatlands, most of which are in Central Kalimantan and Riau provinces (**Table 17**).

The province of Papua has production forest with the largest natural forest, is not included in the area with high deforestation risk. A small portion of the production forest area in Papua province is at moderate to moderate risk (Table 17). In general, some production forest areas in almost all provinces are at moderate to moderate risk. Especially for the provinces in Kalimantan, except for North Kalimantan, most of the natural forest in the production forest area is in the moderate to moderately high category (Table 16).

Table 16. Distribution of natural forest areas within production forest by province

Province	Outside Concession		Within concesion		Total (ha)
	Mineral	Peatland	Mineral	Peatland	
Aceh	1,557	-	169,229	-	170,785
Bangka-belitung	34,461	11,581	49,691	1,459	97,192
Banten	3,892	-	-	-	3,892
Bengkulu	4,217	-	36,691	-	40,909
Gorontalo	200,718	-	30,574	-	231,292
Jambi	199,087	20,180	122,379	24,610	366,256
West Java	35,108	-	-	-	35,108
Central Java	39,965	-	-	-	39,965
East Java	61,726	-	-	-	61,726
West Kalimantan	833,001	146,218	1,213,035	107,625	2,299,878
South Kalimantan	205,463	281	235,751	-	441,495
Central Kalimantan	1,114,132	168,619	3,164,398	112,785	4,559,934
East Kalimantan	1,703,172	6,058	3,071,859	106	4,781,195
North Kalimantan	1,892,800	47,939	1,926,180	12,798	3,879,716
Kepulauan Riau	92,260	13	-	-	92,273
Lampung	7,981	6	84	-	8,071
Maluku	1,335.642	-	823.805	-	2.159.448
North Maluku	728,150	-	494,410	-	1,222,560
West Nusa Tenggara	185,970	-	51,153	-	237,123
East Nusa Tenggara	116,250	-	27,450	-	143,700
Papua	6,929,035	624,301	2,599,766	124,345	10,277,447
West Papua	1,729,654	240,191	2,663,052	158,156	4,791,054
Riau	155,160	46,297	242,650	249,694	693,802
West Sulawesi	233,733	-	54,393	-	288,126
South Sulawesi	47,206	-	15,197	-	62,403
Central Sulawesi	1,420,522	-	511,076	-	1,931,597
Southeast Sulawesi	534,576	-	70,689	-	605,265
North Sulawesi	218,437	-	28,076	-	246,512
West Sumatra	133,972	1,342	198,334	-	333,649
South Sumatra	63,822	6,538	66,409	8,271	145,040
North Sumatra	203,814	541	290,683	19	495,057
Total	**20,465,483**	**1,320,106**	**18,157,013**	**799,869**	**40,742,470**

Table 17. Distribution of natural forest areas within production forest with high to extreme high risk level (IPL 7-9) by province

Province	Outside concession		Within concession		Total (ha)
	Mineral	Peatland	Mineral	Peatland	
Jambi	597	20,049	4,595	27,228	52,470
West Kalimantan	23,456	21,766	53,926	65,599	164,748
South Kalimantan	10,592	69	9,405	-	20,066
Central Kalimantan	190,049	154,995	92,855	34,569	472,467
East Kalimantan	26,633	158	76,568	106	103,465
Lampung	2,430	-	-	-	2,430
Riau	111,290	43,774	99,633	382,383	637,080
West Sumatra	6,174	-	552	-	6,726
South Sumatra	19,753	3,463	9,128	11,136	43,479
North Sumatra	56	87	4,392	-	4,535
North Kalimantan	-	-	32,471	-	32,471
Total	**391,030**	**244,361**	**383,525**	**521,021**	**1,539,937**

Most of the natural forested areas in production forest areas that are in areas of high to extreme high risk are in concession areas and based on IJLH most of them fall into protected directional use that have high forest conservation values Table **19**. The distribution of locations is mostly in the provinces on the island of Kalimantan and the province of Riau. About 50% of the high-risk area is peatland forest and most of it is in the PBPH-HT area. If the natural forest in this area is converted, it will become a large source of GHG emissions.

Table 18. Distribution natural forest areas within production forest with moderate to moderate high risk (IPL 5-6) by province

Province	Outside concession		Within concession		Total (ha)
	Mineral	Peatland	Mineral	Peatland	
Aceh	804	-	4,535	-	5,339
Bangka-belitung	11,515	610	19,784	832	32,740
Banten	2,154	-	-	-	2,154
Bengkulu	41	-	882	-	923
Jambi	196,440	25	85,640	33,731	315,837
West Java	15,351	-	-	-	15,351
Central Java	6,418	-	-	-	6,418
East Java	2,059	-	-	-	2,059
West Kalimantan	279,411	95,027	269,262	84,665	728,365
South Kalimantan	154,182	212	190,898	-	345,292
Central Kalimantan	877,836	13,449	2,953,596	121,384	3,966,265
East Kalimantan	5,681	-	541,251	2,782	549,714
North Kalimantan	-	-	7,275	14	7,289
Kepulauan Riau	2,645	-	-	0	2,645
Lampung	1,963	6	798	-	2,766
Maluku	14,309	-	3,597	-	17,906
North Maluku	24,879	-	-	-	24,879
West Nusa Tenggara	-	-	25,752	-	25,752
East Nusa Tenggara	7,795	-	12,220	-	20,015
Papua	266,093	26,121	9,882	8,117	310,213
West Papua	120,476	59,701	-	-	180,177
Riau	33,332	1,277	63,335	90,922	188,866
West Sulawesi	-	-	712	-	712
South Sulawesi	15,599	-	1,019	-	16,618
Central Sulawesi	8,400	-	-	-	8,400
Southeast Sulawesi	2,030	-	12,924	-	14,954
North Sulawesi	-	-	1,597	-	1,597
West Sumatra	3,787	-	29	-	3,816
South Sumatra	43,893	3,075	17,221	42,641	106,830
North Sumatra	50,055	6	71,260	20	121,341
Total	**2,147,147**	**199,509**	**4,293,470**	**385,108**	**7,025,233**

Table 19. Distribution of natural forest within PBPH-HT concession areas in production forest with high risk level (IPL 7-9)

Prrovince	Mineral		Peatland		Total (ha)
	Protection	Production	Protection	Production	
Jambi	2,558		69		2,627
West Kalimantan	27,834	14,423	58,812	300	101,368
South Kalimantan	464	5			469
Central Kalimantan	18,421	1,699	9,038		29,159
East Kalimantan	28,319	28,193	106		56,619
Riau	58,331	6,253	124,782		189,366
South Sumatra	5,780	3,263	6,552		15,595
North Sumatra		4,392			4,392
Total	**141,707**	**58,229**	**199,359**	**300**	**399,595**

Table 20. Distribution of natural forest within PBPH-HA concession areas in production forest with high risk level (IPL 7-9)

Province	Mineral		Peatland		Total (ha)
	Protection	Production	Protection	Production	
Jambi			5,438		5,438
West Kalimantan	39	9	1,240		1,288
East Kalimantan	6,497	13,517			20,014
North Kalimantan		32,471			32,471
Riau	1,238	7	70,964		72,209
Total	**7,775**	**46,003**	**77,641**		**131,419**

Table 21. Distribution of natural forest within PBPH-RE concession areas in production forest with high level of risk (IPL 7-9

Province	Mineral		Peatland		Total (ha)
	Protection	Production	Protection	Production	
Jambi	20,138	1,044			21,182
Riau	125,891		9,478		135,369
South Sumatra	299	12			311
Total	**146,328**	**1,056**	**9,478**		**156,862**

Table 22. Distribution of natural forest within the area licenced for social forestry in production forest areas with high risk level (IPL 7-9)

Province	Mineral		Peatland		Total (ha)
	Protection	Production	Protection	Production	
PS Permitted Area					
Jambi	38	8	336		381
West Kalimantan	956	132	884		1,972
Central Kalimantan	9,577	1,009	6,488		17,074
Riau	7,058	1,892	4,517		13,466
West Sumatra	0	5			5
South Sumatra			8		8
Sub-Total	**17,628**	**3,047**	**12,232**		**32,906**
Indicative area for PS (PIAPS)					
Jambi	1,755	237	203		2,196
West Kalimantan	7,293	3,240	4,357	8	14,898
South Kalimantan	116	8,819			8,936
Central Kalimantan	47,813	14,335	19,042		81,190
East Kalimantan	41				41
Riau	12,639	9,207	49,759	0	71,605
West Sumatra	541	5			547
South Sumatra	73	12	4,266		4,351
Sub-Total	**70,273**	**35,856**	**77,627**	**8**	**183,764**
TOTAL	**87,901**	**38,903**	**19,994**	**8**	**216,670**

Referring to

Table 17 the province with the largest area of natural forest with a high level of risk is Riau. By using a template, the area of natural forest in each management unit can be described in more detail along with the institutional typology. In Riau Province there are 25 KPHP Units and three KPHs (Unit IX, XVIII and XXIV) located in areas with very high risk (IPL 8) to extreme high (IPL 9) with natural forest area almost reaching 0.64 million hectares (**Table 23** Most of the institutional typologies of KPHs in Riau Province are typology 3. This condition shows that all KPHs in Riau Province have high social capital, meaning that the institutional conditions of KPHs are strong and effective, but the presence and level of community activity in the area is relatively low. The programme for strengthening community social capital in order to support the management of FMUs in typology 3 needs to be prioritised.

Table 23. Distribution of natural forest with high risk in KPHP unit in Riau Provinsi

FMU Unit	Typology	IPL	Mineral	Peatland	Total (Ha)
Unit I	2	7	2,228	1,416	3,645
Unit II	3	7	1,213	34,823	36,036
Unit III	3	7	434	20,111	20,545
Unit IV	3	7	4,574	14,995	19,569
Unit IX	1	9	286	15	301
Unit V	3	7	274	888	1,161
Unit VI	3	7	378	64,122	64,500
Unit VII	3	7	2,631	20,582	23,213
Unit VIII	1	7	7	23	30
Unit XII	2	7	1,242	481	1,723
Unit XIV	2	5	0	-	0
Unit XIX	3	7	3,156	1,429	4,585
Unit XVII	2	7	3,054	-	3,054
Unit XVIII	1	8	55,822	-	55,822
Unit XX	3	7	2,006	676	2,682
Unit XXI	3	7	3,415	12,887	16,302
Unit XXII	3	7	102,164	123,122	225,286
Unit XXIII	4	7	40	16,168	16,208
Unit XXIV	2	9	5,705	32,474	38,180
Unit XXIX	1	7	469	117	586
Unit XXV	4	7	104	11,080	11,184
Unit XXVII	3	7	90	56,120	56,210
Unit XXVIII	3	6	-	3,627	3,627
Unit XXX	1	7	3,022	-	3,022
Unit XXXI	1	6	2	-	2
Unit XXXII	1	7	12,035	-	12,035
Non-KPHP			6,572	11,001	17,573
Total			**210,923**	**426,157**	**637,080**

Further analysis is to see the coFMU KPH unit, and can be studied by integrating it with land cover information. For example, KPHP Unit XXII has the highest forested area, reaching 0.22 million hectares. From an institutional perspective, taking into account the existence of concessions, KPHP Unit XXII is in typology B3 which means that the FMU area is already widely occupied by the community and the institutional capacity of the FMU is relatively strong, and more than 50% of the area has been licenced (**Table 24** The IPL value is high, namely 7 with a high IBGF score for emissions from deforestation and fire IBGF, while the

IBGF absorption is low. So, historically this area has a fairly high rate of natural forest conversion and has the opportunity to experience repeated fires.

Most of the XXII KPHP unit areas have been granted permits, namely PBPH-HT and IPHHK-RE which have been concessioned by approximately 47% and 32% of the KPH area, respectively (**Table 24**). The participation of the concessions/companies in saving natural forests becomes very important. The area that is still natural forested in the PBPH-HT concession is 54,000 hectares and in the PBPH-RE it is around 108,000 hectares. The potential for natural forest conversion within the concession area is quite large because most of the natural forest area is located in the PBPH-HT concession area which according to regulations can be used for plantation forest development. Based on the IJLh value, all areas that are still natural forest within the PBPH-HT area as well as PBPH-RE area, are included in the protection direction that must be maintained.

Table 24. Condition of land cover within the KPHP Unit XXII area of Riau Province

Manager	Unit	Natural Forest	Plantation Forest	Plantation	Cultivation	Built	Non-productive	Others	Total (Ha)
KPH	Non-Consession	42,630	5,282	40	2		2,234	0	50,188
HT	CV AL	903	3,168				707		4,778
	CV ML	348					65		413
	PT AA	5,481	18,146	0			1,821		25,449
	PT BKM	6,325							6,325
	PT ELD	1,340	3,865				121		5,327
	PT MHJ	408	2,664				576		3,649
	PT RA	32,954	49,727		0		12,029	1	94,711
	PT SPA	1,935	5,143				3		7,081
	PT SAU	2,251	1,937				811		4,999
	PT TF	2,438	4,038				1,456		7,932
	PT TN	88	962				3		1,053
RE	GAN	35,691					86		35,778
	PT SM	32,438					3		32,440
	PT. GCN	19,710	4						19,714
	BOU	38,052					1,921	0	39,974
PIAPS	Indicative for PS	766							766
	PS proposal process	1,528							1,528
	TOTAL	**225,286**	**94,936**	**40**	**2**	**-**	**21,837**	**1**	**342,102**

Note: The Certification status of all PBPH-HT are classified as good

The high level of unproductive land and agricultural cultivation activities within the KPH and within the concession area indicates a high level of tenure problems. The opportunity for the development of cultivated areas by the community is also relatively high. The role of FMUs and concession holders in controlling forest conversion is very important. Based on the assessment of PHL certification status, all concessions in this KPHP are considered good. However, given the relatively high level of risk of deforestation and fire in this FMU, and also the existence of a fairly large area of unproductive land, evaluation of the contribution of concessions in addressing community socioeconomic problems needs to receive great attention in certification assessments as well as their role in overcoming the problem of fire.

To further identify roles and forms of programmes and mitigation measures and specifically target the small FMU management unit, Land cover condition information may be used. Referring to **Table 24**, the management unit of the FMU which has a fairly large natural forest is PT. RA and also has a relatively large area of unproductive land and agricultural land (cultivating seasonal crops and plantations). This indicates that the management unit has been occupied by a large number of people, and is likely to experience conflict as a result of ongoing community activities.

Efforts to develop forestry partnerships between permit holders and communities need to be encouraged so that the utilisation of concession areas becomes more efficient and provides larger business opportunities for the communities and can reduce threats to forests. The existence of a multibusiness policy will open up greater opportunities for companies and communities to develop partnerships outside of plantation business activities. Incorporating this aspect as one of the indicators of sustainable forest management certification can spur the development of forestry partnership patterns that will increase land use efficiency or reduce the presence of unproductive land and increase community business productivity in concession areas. The establishment of this forestry partnership is expected to reduce the level of threat to the existence of natural forests in the concession area as well as the concession area itself.

Within the production forest area there are also areas that do not have KPHs, hereinafter referred to as non-KPHP areas. This area is generally included in the Convertible Production Forest (HPK) area. In non-KPHP areas, there are also natural forest areas which are quite large reaching 4 million hectares, and based on IJLE directives, about 21% of this area is included in the protection directional use (**Table 25**), and the rest goes to production directional use. HPK areas are currently included in the FMU management through revision.

Table 25. Distribution of natural forest within non-KPHP areas in production forest for all priority areas (IPL 1=9) by province

Province	Mineral		Peatland		Total (ha)
	Protection	Production	Protection	Production	
Aceh	608	804			1,412
Bangka-belitung	11		0		11
Banten	0	3,782			3,782
Bengkulu	3				3
DKI Jakarta	1				1
Gorontalo	2,781	5,413			8,194
Jambi		2			2
West Java	118	34,418			34,536
Central Java	2,717	35,817			38,534
East Java	4,438	57,128			61,566
West Kalimantan	6,814	1,486	10,810		19,109
South Kalimantan	78	4,476	260		4,814
Central Kalimantan	113,018	14,012	45,904	5	172,938
East Kalimantan	12,850	3,442	175		16,466
North Kalimantan	182	22,873	4,869		27,924
Kepulauan Riau	2,591	36,903			39,494
Maluku	148,978	577,644			726,623
North Maluku	1,338	242,031			243,369
East Nusa Tenggara	1	11,716			11,717
Papua	11,410	1,457,611	193,377	13	1,662,412
West Papua	11,926	554,080	104,484	3	670,493
Riau	4,947	2,715	11,001	0	18,663
West Sulawesi	4,145	4			4,149
South Sulawesi	10,446	2			10,448
Central Sulawesi	75,467	44,875			120,343
Southeast Sulawesi	17,433	19,864			37,297
North Sulawesi		7,461			7,461
West Sumatra	17,555	34,770	699		53,024
South Sumatra	4				4
North Sumatra	4,075	1,295	87		5,457
Total	**453,934**	**3,174,625**	**371,665**	**21**	**4,000,245**

Based on the IPL analysis, of the natural forest area of 4 million hectares, approximately 0.21 million hectares are located in areas with a high to extreme high Location Priority Index (**Error! Not a valid bookmark self-reference.**) and about 0.39 million hectares at moderate to moderate IPL (IPL 5-6;Table **27**Areas with IPL 7-9 have a fairly high threat of deforestation and most (83%) are in Central Kalimantan Province, while areas with IPL 5-6 have a moderate level of threat of deforestation and most of them are in two provinces (70%) namely Papua and West Papua. At present this is an intended non-FMU area (which has HPK status) currently revised for entering in the area of FMU management.

Table 26. Distribution of natural forest within non-KPHP areas on high risk areas (IPL 1-9) by province

Province	Mineral		Peatland		Total (ha)
	Protection	Production	Protection	Production	
West Kalimantan	1,078	1,198	3,457		5,734
South Kalimantan	78	4,476	48		4,602
Central Kalimantan	113,018	14,012	45,904	5	172,938
East Kalimantan	1,102	497	158		1,758
Riau	4,194	2,378	11,001	0	17,573
West Sumatra	3,062	222			3,285
North Sumatra		56	87		143
Total	**122,532**	**22,840**	**60,654**	**5**	**206,031**

Table 27. Distribution of natural forest within non-KPHP areas on moderate to moderate high risk areas (IPL 5-6) by province

Province	Mineral		Peatland		Total (ha)
	Protection	Production	Protection	Production	
Aceh		804			804
Bangka-belitung	11				11
Banten	0	2,154			2,154
Bengkulu	3				3
West Java	118	15,233			15,351
Central Java		6,418			6,418
East Java	0	2,059			2,059
West Kalimantan	5,735	287	7,353		13,375
South Kalimantan			212		212
East Kalimantan	90	1,557			1,647
Maluku	2,620	11,688			14,309
North Maluku	29	24,850			24,879
East Nusa Tenggara		4,701			4,701
Papua	620	149,459	13,685	0	163,764
West Papua	1,375	101,037	17,093	1	119,505
Riau	753	337			1,090
South Sulawesi	7,231	2			7,233
Central Sulawesi	762	7,638			8,400
Southeast Sulawesi	1	2,030			2,030
West Sumatra	1,673	890			2,563
South Sumatra	4				4
North Sumatra	4,075	1,240			5,314
Total	**25,101**	**332,383**	**38,343**	**1**	**395,828**

4.2.1.2. Protection Forest Area

The protected forest area included in the KPHL area which is still natural forest is quite extensive, reaching 16.6 million hectares and almost 50% of which is in the Papua

Province and Aceh Province (**Table 28**). Nearly 10% of the area that is still natural forest is an area for social forestry permits (concessions). Based on the results of the location priority analysis (IPL), natural forested areas in KPHL which are in areas with high to extreme high risk of deforestation (IPL 7-9) are very low, namely less than 0.5% or 79 ,000 hectares, most of which (70%) in Central Kalimantan Province (**Table 29** Furthermore, natural forested areas located in moderate to moderately high risk areas (IPL 5-6) are also relatively low at around 1.2 million hectares (7.4%) spread over 20 provinces and more than 70% of this area is in six provinces. namely in the provinces of West Kalimantan, South Sumatra, South Kalimantan, East Nusa Tenggara, Bengkulu, and Papua (**Table 30**).

Table 28. Distribution of natural forest within KPHL areas on on all priorities areas (IPL 1-9) by province

Province	Outside Concession		Within Concession (Social Forestry)		Total (ha)
	Mineral	Peatland	Mineral	Peatland	
Aceh	1,468,247		270,893		1,739,140
Bali	69,630		857		70,487
Bangka-belitung	23,382	68	4,246	211	27,907
Bengkulu	158,834		10,610		169,444
Gorontalo	180,382		4,255		184,637
Jambi	578	6,585			7,163
West Kalimantan	783,189	49,602	90,899	10,566	934,257
South Kalimantan	143,700		11,534		155,233
Central Kalimantan	49,022	88,107	80	11,962	149,170
East Kalimantan	465,644		4,934		470,577
North Kalimantan	49,459		1,100		50,558
Kepulauan Riau	7,748		3,218		10,965
Lampung	31,761		8,349		40,109
Maluku	140,251		1,186		141,437
North Maluku	302,657		8,180		310,837
West Nusa Tenggara	198,021		136,739		334,760
East Nusa Tenggara	235,148		159,264		394,412
Papua	6,077,280	188,701	224,120	62,395	6,552,496
West Papua	755,308	105,355	32,826	36,436	929,925
Riau	32,840		975		33,815
West Sulawesi	257,745		7,608		265,353
South Sulawesi	847,735		48,501		896,236
Central Sulawesi	578,055		65,216		643,271
Southeast Sulawesi	799,942		42,897		842,840
North Sulawesi	16,366		1,611		17,977
West Sumatra	251,312		293,719		545,032
South Sumatra	197,986	236	1,847		200,069
North Sumatra	464,821	1,735	58,027	240	524,823
Total	**14,587,045**	**440,388**	**1,493,689**	**121,810**	**16,642,932**

Table 29. Distribution of natural forest areas within protection forest with high to extreme high risk level (IPL 7-9) by province

PROVINCE	Outside Concession		Within concession		Total (ha)
	Mineral	Peatland	Mineral	Peatland	
Bengkulu	3,691				3,691
Central Kalimantan	16,909	22,616		11,243	50,767
East Kalimantan	6,234		100		6,334
Lampung	727				727
South Sumatra	11,952				11,952
North Sumatra	5,083		432		5,514
Total	**44,595**	**22,616**	**532**	**11,243**	**78,985**

Table 30. Distribution of natural forest areas within production forests with moderate to moderate high risk level (IPL 5-6) by province

PROVINCE	Outside Concession		Within concesion		Total (ha)
	Mineral	Peatland	Mineral	Peatland	
Aceh	63		7		69
Bangka-belitung	8,701		2,943		11,643
Bengkulu	114,885		7,269		122,154
Jambi	578	6,585			7,163
West Kalimantan	208,810	32,677	8,309	220	250,016
South Kalimantan	143,700		11,534		155,233
Central Kalimantan	30,553	65,491	23	719	96,786
East Kalimantan	1,053				1,053
Lampung	20,801		683		21,484
Maluku	2,637		587		3,224
West Nusa Tenggara	6,315		531		6,845
East Nusa Tenggara	82,857		59,555		142,412
Papua	97,396		24,535		121,931
Riau	29,512		629		30,141
South Sulawesi	49,877		6,561		56,438
Southeast Sulawesi	1,131		1,763		2,894
North Sulawesi	16,367		1,611		17,977
West Sumatra	343		534		878
South Sumatra	154,919	236	1,780		156,935
North Sumatra	9,424	1,734	11,010	1	22,169
Total	**979,920**	**106,723**	**139,862**	**939**	**1,227,445**

Table 29 with natural forested areas located in social forestry management areas (concessions) with a high level of deforestation risk reaching 78,985 ha spread over 6 provinces, where the largest area is in the province Central Kalimantan which reaches 50,767 ha. A more detailed analysis shows that about 11,243 ha (96%) falls into a protected direction because it has high forest conservation value. About 73% of the area has been issued a Customary Forest Social Forestry Permit or HKm (

Table **31**).

Furthermore, a more detailed analysis of the province which has the largest area of natural forest with a high risk of deforestation reaching 50,767 ha in Central Kalimantan Province (**Table 32**) shows that most of the area is in Unit XXXII- KPHL which is around 48,544 Ha (96%). From the aspect of institutional and social conditions, KPHL is categorised as typology 3 with strong institutional capacity. The total area of Unit XXXII-KPHL reaches 164,686 ha, and land cover that is not natural forest is dominated by unproductive land and part of it has been used by the community for cultivation of seasonal crops and plantations (**Table 33**). Some areas that have been used by the community have obtained a Social Forestry (PS) permit.

Table 31. Distribution of natural forest areas in licenced areas for social forestry in protection forest areas with high risk (IPL 7-9)

PROVINCE	Mineral		Peatland		Total (ha)
	Protection	Production	Protection	Production	
Licenced area for PS					
Central Kalimantan			8,531		8,531
East Kalimantan	100				100
Sub-Total	100		8,531		8,631
Indicative for PS					
Central Kalimantan			2,712		2,712
North Sumatra		432			432
Sub-Total		432	2,712		3,144
Total	**100**	**432**	**11,243**		**11,775**

Table 32. Distribution of protection forest areas inside and outside concessions on priority locations 7, 8, and 9 in Central Kalimantan Province

KPHL Unit	Typology	IPL	Outside Concession		Inside PIAPS		Total (ha)
			Mineral	Peatland	Mineral	Peatland	
Unit IV	1	7	283	2,187		110	2,580
Unit XXXII	3	8	16,626	20,429		11,132	48,187
Total			**16.909**	**22.616**	**-**	**11,243**	**50,767**

Table 33further shows that the area of Unit XXXII-KPHL is mostly a non-concession area (no PS permit yet) which reaches 127,030 ha (75%), and about 25% of this area has been utilised by the community while 45% is in the form of unproductive land. (Index s). The priority of Unit XXXII location is 8 with high IBGF emission (3), medium IBGF absorption (2) and high IBGF fire (3). Based on this condition, Unit XXXII-KPHL needs to get priority in implementing programmes and activities that support the development of social forestry programmes and can be synergised with land and forest rehabilitation programmes.

Table 33. Distribution of land cover in protection forest areas within unit XXXII - KPHL with IPL 7-9 in Central Kalimantan Province

Manage-ment	Unit	Natural Forest	Plantation	Cultivati-on	Built	Not Productiv-e	Others	Total (ha)
FMU	Non Concession	37,055	18,329	13,492	482	55,625	2,046	127,030
PIAPS	Indicative for PS	2,614	710	2,144	8,485			13,954
	Non-HTR	3,239			5,153			8,392
	Process-Proposed PS	5,279	126	726	9,180	1		15,311
Total		**48,187**	**19,165**	**16,362**	**23,300**	**55,626**	**2,046**	**164,686**

The natural forested area in protected forest areas outside of KPHL (non-KPHL) is also relatively large, reaching 0.527 million hectares, most of which (91%) are located on the island of Java (**Table 34**). Almost all areas that are still naturally forested in non-KPHL areas

in Java are included in the protection direction. Natural forest area with IPL 7-9 in non-KPHL area is not large, only about 421 ha in Banten Province, while IPL 5-6 reaches 73,266 ha spread over West Java, Central Java, East Java and West Sumatra. Province West Java is the largest around (68%), followed by Central Java (25%), East Java (3%), and West Sumatra (4%).

Table 34. Distribution of natural forest areas in non-KPHL areas for all priority areas (IPL1-9) by province

Province	Protection		Production		Total (ha)
	Mineral	Peatland	Mineral	Peatland	
Banten	4,352				4,352
Special Region of Yogyakarta	130				130
DKI Jakarta	7				7
West Java	151,851		3		151,854
Central Java	72,819		4		72,823
East Java	293,546		1		293,547
South Kalimantan			421		421
West Sumatra	2,105		2,243		4,348
Total	**524,811**		**2,671**		**527,482**

4.2.1.3. Conservation Forest Area

In Conservation Forest (HK) areas, the area that is still natural forest is around 16.5 million hectares and 9% on peatlands (**Table 35**). Large areas of natural forest that exceed one million hectares are located in four provinces, namely West Kalimantan, North Kalimantan, Papua, and West Papua. Of this area, which falls into high priority to extreme high priority areas (IPL 7-9) only about 0.31 million hectares, or less than 2%, (**Table 36**) and which are included in the medium to moderately high priority area (IPL 5-6) around 10% (**Table 37**). This shows that the threat level of deforestation and forest fires in conservation forest areas is relatively low compared to other areas.

Natural forest areas within conservation forest areas that are classified as high priority due to the high level of deforestation and fire risk (IPL 7-9), exist in two provinces, namely Central Kalimantan Province and Jambi Province (**Table 36**). Nearly 50% of this area is peatland forest. Furthermore, in conservation forest areas that are still in the medium to rather high priority (IPL 5-6), most (72%) are spread over three provinces, namely Central Kalimantan, Papua, and Riau (**Table 37**). In particular, the areas with a high level of risk in Jambi province are in the East Coast Mangrove Forest Nature Reserve and Berbak National Park (**Table 38**), and almost all of this area is in Berbak National Park. This indicates that for Jambi Province, the Berbak National Park needs to get a high priority in the implementation of the natural forest protection programme.

Table 35. Distribution of natural forest in KPHK areas for all priority locations (IPL1-9) by province

Province	Mineral	Peatland	Total (ha)
Aceh	667,892	71,121	739,012
Bali	3,379		3,379
Bangka-Belitung	4,872	137	5,009
Banten	57,117		57,117
Bengkulu	377,448		377,448
Special Region of Yogyakarta	1,322		1,322
DKI Jakarta	37		37
Gorontalo	185,695		185,695
Jambi	481,636	78,314	559,950
West Java	103,227		103,227
Central Java	4,313		4,313
East Java	172,964		172,964
West Kalimantan	1,092,624	29,001	1,121,625
South Kalimantan	82,710		82,710
Central Kalimantan	461,890	460,928	922,818
East Kalimantan	148,425	182	148,608
North Kalimantan	1,243,908		1,243,908
Kepulauan Riau	1,115		1,115
Lampung	222,343	12	222,355
Maluku	366,989		366,989
North Maluku	201,181		201,181
West Nusa Tenggara	76,731		76,731
East Nusa Tenggara	124,480		124,480
Papua	4,695,023	600,494	5,295,516
West Papua	1,487,790	44,777	1,532,566
Riau	293,780	154,323	448,103
West Sulawesi	179,705		179,705
South Sulawesi	30,648		30,648
Central Sulawesi	540,577		540,577
Southeast Sulawesi	196,156		196,156
North Sulawesi	209,410		209,410
West Sumatra	647,167		647,167
South Sumatra	362,190	18,379	380,569
North Sumatra	371,553		371,553
Total	**15,096,295**	**1,457,668**	**16,553,963**

Table 36. Distribution of natural forests on KPHK areas on high to extreme high priority locations (IPL 7-9) by province

PROVINCE	Mineral	Peatland	Total (ha)
Jambi	28,521	71,434	99,955
West Kalimantan	4,356	22	4,378
South Kalimantan	191		191
Central Kalimantan	84,172	60,250	144,421
East Kalimantan	15,894	182	16,076
Lampung	390		390
Riau	26,724		26,724
South Sumatra	17,926		17,926
Total	**178,174**	**131,888**	**310,062**

Table 37. Distribution of natural forests on KPHK areas on moderate to moderate high priority locations (IPL 5-6) by province

Province	Mineral	Peatland	Total (ha)
Bangka-belitung	3,597	137	3,734

Province	Mineral	Peatland	Total (ha)
Bengkulu	128		128
Special Region of Yogyakarta	1,322		1,322
Gorontalo	140		140
Jambi	35,359	6,880	42,240
West Java	1,612		1,612
Central Java	1,204		1,204
East Java	4,174		4,174
West Kalimantan	137,917	11,745	149,662
South Kalimantan	82,449		82,449
Central Kalimantan	190,523	400,678	591,201
Kepulauan Riau (Islands of Riau)	1,115		1,115
Lampung	40,516	12	40,528
Maluku	72		72
West Nusa Tenggara	20,510		20,510
East Nusa Tenggara	17,562		17,562
Papua	459,796		459,796
Riau	127,947	154,323	282,270
Central Sulawesi	1,315		1,315
Southeast Sulawesi	154		154
North Sulawesi	62		62
West Sumatra	4		4
South Sumatra	101,116	18,379	119,495
North Sumatra	10,256		10,256
Total	**1,238,849**	**592,156**	**1,831,005**

Table 38. Distribution of natural forests on KPHK areas in Jambi Province on high to extreme high priority locations (IPL 7-9)

Nama KPHK	Typology	IPL	Mineral	Peatland	Total (ha)
Hutan Bakau Pantai Timur Strict Nature Reserve	1	7	1,826		1,826
Berbak National Park	3	7	26,695	71,434	98,129
Total			**28,521**	**71,434**	**99,955**

In further observation, Berbak National Park in Jambi Province has an area of about 140,800 hectares, and about 70% is still natural forest, while 30% is dominated by unproductive land, and a small portion of plantations and cultivation of seasonal crops (

Table 39).

The institutional typology falls into type 3, which means that the institutional capacity is strong, but community activities are still relatively small. However, due to the large area of unproductive land, it indicates that this area has also had a lot of encroachment activities. In this area, it is necessary to direct programmes and activities that are able to support the strengthening of community social capital in order to support the management of the National Park in the form of a Conservation Partnership which is the responsibility of the DG of KSDAE. Its implementation can be conducted by synchronising with the programme from other DGs, such as PDASRH for the rehabilitation of unproductive lands.

Table 39 Distribution of natural forests in Berbak Nasional Park of Jambi Province with moderate to high to extreme high priority locations (IPL 7-9)

Name of KPHK	Typology	IPL	PL 2019	Mineral	Peatland	Total (ha)
Berbak National Park-Jambi	3	7	Natural forest	26,695	71,434	98,129
			Plantation forest			
			Plantation	634	420	1,054
			Cultivation	42		42
			Built			
			Non-productive	29,430	12,144	41,574
			Others (Water)	1		1
Total (ha)				**56,802**	**83,998**	**140,800**

4.2.1.4. Other Land Uses (APL)

In the APL area, both in HGU and non-HGU, the area that is still natural forest is about 6 million hectares, and about 15% of this area is peatland forest. Around 84% of this natural forest area is in APL areas that have not yet been granted a HGU permit (non-HGU-APL; **Table 40**) and the rest in the HGU area. Based on its function, the area that has become APL can be used for development or activities outside the forestry sector. Therefore, the forest land has the potential to be converted to non-forest. To reach the 2030 net sink, natural forest conversion must be stopped (see **Table 15**). If the policy of saving natural forest in APL is not implemented, then the net target sinks are difficult to reach. Efforts to expand forested areas in APL into forest areas or in the spatial plan of forested areas are included as protected zones. The government is carrying out efforts to keep natural (heavy) or forested vegetation in either HGU or APL from being maintained, including by carbon offset activities.

Natural forested areas which are assumed to be designated as protected zones in spatial planning have the potential to be deforested by illegal activities, especially in areas that are included in the forest, in high to extreme high priority (IPL 7-9). The results of the IBGF analysis show that the area of natural forest in non-HGU APL located in high priority areas (IPL 7-9) reaches 0.67 million hectares (**Table 41** About 18% of the area is natural peat forest area, and most of it is in East Kalimantan and Central Kalimantan provinces (**Table 42**).

Meanwhile, natural forested areas with high deforestation risk (IPL 7-9) in APL-HGU reached 0.30 million hectares (**Table 43**), and most of them fall into protected areas, reaching 224,755 ha (74%). Furthermore, the natural forested area in the APL-Non HGU area which is included in the medium to rather high priority areas (5-6) reaches 1.28 million hectares Table **43** and that in the APL-HGU area is around 0.19 million hectares (**Table 44**). Deforestation prevention efforts should be prioritised in high-risk areas.

Table 40. Distribution of natural forests within Other Land Uses (APL) areas for all priority locations (IPL 1-9) by province

Province	APL-Non HGU		HGU		Total (ha)
	Mineral	Peatland	Mineral	Peatland	
Aceh	160,125	12,211	18,676	3,638	194,649
Bali	2,705				2,705
Bangka-belitung	27,242	79			27,321
Banten	2,774				2,774
Bengkulu	17,410	49	13,688		31,147
Special Region of Yogyakarta	63				63
DKI Jakarta	11				11
Gorontalo	57,987		171		58,159
Jambi	51,571	708	455	168	52,902
West Java	9,842				9,842
Central Java	14,006				14,006
East Java	30,251				30,251
West Kalimantan	137,427	55,378	141,496	102,742	437,042
South Kalimantan	40,327	2,375	5,081		47,783
Central Kalimantan	89,165	21,895	26,413	2,257	139,730
East Kalimantan	416,348	42,653	157,170	856	617,027
North Kalimantan	320,476	13,316	148,681	43,861	526,333
Kepulauan Riau (Islands of Riau)	45,073	791	4,403		50,268
Lampung	12,047		254		12,301
Maluku	130,855				130,855
North Maluku	99,932				99,932
West Nusa Tenggara	106,172				106,172
East Nusa Tenggara	818,415				818,415
Papua	857,163	60,234	150,585	33,717	1,101,699
West Papua	409,891	35,883	7,473	27	453,274
Riau	17,012	12,202	10,923	8,154	48,291
West Sulawesi	27,943		304		28,247
South Sulawesi	67,472		64		67,535
Central Sulawesi	395,963		26,250		422,213
Southeast Sulawesi	99,335		598		99,934
North Sulawesi	44,836		254		45,090
West Sumatra	149,153	107	3,634	1	152,895
South Sumatra	47,479	490			47,969
North Sumatra	127,433	1,993	687	70	130,182
Total	**4,833,904**	**260,363**	**717,259**	**195,491**	**6,007,017**

Table 41 Distribution of natural forests on Non-HGU APL areas with high to extreme high priority locations (IPL 7-9) by province

ProvinceE	Mineral		Peatland		Total (ha)
	Protection	Production	Protection	Production	
Bengkulu	1,945	2,305			4,250
Jambi	3	689	47		739
West Kalimantan	65,506	33,126	42,219		140,851
South Kalimantan	3,355	3,046	2,375		8,776
Central Kalimantan	72,827	10,959	21,636		105,422
East Kalimantan	159,062	140,828	38,616		338,505
Lampung	2,894	61			2,955
Riau	10,969	5,370	12,174		28,513
South Sumatra	7,392	26,219	490		34,101
North Sumatra	650	5,062	301		6,012
Total	**324,603**	**227,664**	**117,857**		**670,124**

Table 42. Distribution of natural forests on HGU-APL areas with high to extreme high priority locations (IPL 7-9) by province

Prrovince	Mineral	Peatland	Total (ha)

	Protection	Production	Protection	Production	
Jambi	7	69	54		129
West Kalimantan	82,113	26,699	62,271		171,084
South Kalimantan	348	839			1,187
Central Kalimantan	22,086	3,212	2,256		27,554
East Kalimantan	37,423	45,766	138		83,328
Lampung	230	24			254
Riau	9,682	1,066	8,131		18,879
North Sumatra	1	2	15		18
Grand Total	**151,890**	**77,677**	**72,865**		**302,434**

Table 43. Distribution of natural forests on Non HGU-APL areas with moderate to moderate high priority locations (IPL 5-6) by province

PROVINCE	Mineral		Peatland		Total (ha)
	Protection	Production	Protection	Production	
Aceh	46,613	23,109	4,669		74,391
Bali	4	76			80
Bangka-belitung	5,268	15,402	79		20,749
Bengkulu	4,014	994	49		5,056
Gorontalo	351	986			1,337
Jambi	40,514	9,825	661		51,000
West Java	6	958			964
Central Java		481			481
East Java		1,226			1,226
West Kalimantan	16,893	20,777	12,877	2	50,548
South Kalimantan	8,545	20,981			29,526
Central Kalimantan	3,192	151	227		3,570
East Kalimantan	72,422	39,769	4,037		116,228
North Kalimantan	15,345	36,849			52,195
Kepulauan Riau (Islands of Riau)	12,566	31,182	791		44,539
Lampung	1,274	1,374			2,648
Maluku	5,330	23,218			28,548
North Maluku	2,316	8,677			10,993
West Nusa Tenggara	2,017	79,923			81,940
East Nusa Tenggara	5,129	342,173			347,302
Papua	10	19,685	1,195		20,890
West Papua	395	28,005	380		28,781
West Sulawesi	9,608	11,697			21,305
South Sulawesi	37,027	8,888			45,915
Central Sulawesi	6,785	26,278			33,062
Southeast Sulawesi	1,197	8,801			9,998
North Sulawesi	8,900	33,228			42,128
West Sumatra	42,716	21,895	107		64,718
South Sumatra	2,322	10,779			13,101
North Sumatra	30,608	46,723	1,541		78,872
Total	**381,368**	**874,108**	**26,612**	**2**	**1,282,091**

Table 44. Distribution of natural forests on HGU-APL areas on moderate to moderate high priority locations (IPL 5-6) by province

PROVINCE	Mineral		Peatland		Total (ha)
	Protection	Production	Protection	Production	
Aceh	5,540	2,219	824		8,583
Bengkulu	954	277			1,230
Gorontalo	171				171
Jambi	71	308	114		493

PROVINCE	Mineral		Peatland		Total (ha)
	Protection	Production	Protection	Production	
West Kalimantan	6,153	24,208	37,624	2	67,987
South Kalimantan	1,587	1,627			3,214
East Kalimantan	32,536	39,004	718		72,258
North Kalimantan	5,133	20,983			26,116
Kepulauan Riau (Islands of Riau)	1,090	2,713			3,803
West Sulawesi	161	143			304
South Sulawesi	46	11			57
North Sulawesi		254			254
West Sumatra	2,523	1,108	1		3,632
North Sumatra	5	652	53		711
Total	**55,971**	**93,506**	**39,334**	**2**	**188,813**

With the template, further analysis can be carried out to determine more specifically the areas that are the priority targets for the implementation of avoided deforestation actions. Referring to **Table 42**, the province with the largest natural forest and high risk of deforestation in APL-HGU is West Kalimantan Province with a total area of about 0.17 million hectares. A more detailed description of high risk natural forest areas in West Kalimantan Province can be seen in **Table 45**. It was found that there are 159 HGU units that still have natural forest areas with very high risk (IPL 8) to extreme high (IPL 9). Based on the IJE most of these areas fall into the hedging direction (84%).

The policy of prohibiting forest clearing in areas based on the value of the ecosystem service index needs to be implemented and can be part of the mandatory certification process. This can also be in the spatial planning process as well as in development planning, including the management plan of the Forest Management Unit.

Table 45. Distribution of natural forests on HGU areas in West Kalimantan Province with high to extreme high priority locations (IPL 7-9) by management unit

Name of HGU	Mineral		Peatland		Total (ha)
	Protection	Production	Protection	Production	
KUD		257			257
PT. AA	95	2	53		150
PT. AJB	2,165	41			2,207
PT. ASP		229			229
PT. APN		1,349	18		1,367
PT. ALM	11	10			21
PT. APL	120	7			127
PT. APPM	4	1			5
PT. AI 3	27		56		83
PT. ABP	233	2	1,030		1,265
PT. ASJ		127			127
PT. ABP		81			81
PT. AMS		216			216
PT. AS 1	76	4			80
PT. AMS	53	3			56
PT. BSP 2	1,178	11			1,190
PT. BSP3	1,158	88	815		2,062
PT. BS	726	90			816
PT. BSA 1	283	72			355
PT. BSA 2	20	38			58
PT. BSL		1,453			1,453
PT. BBS 2	1	0	0		1
PT. BES	2,927	29	9,401		12,357
PT. BIA 1	0	257	9,159		9,416

Name of HGU	Mineral		Peatland		Total (ha)
	Protection	Production	Protection	Production	
PT. BIA 2			7,426		7,426
PT. BKS	18	3			21
PT. BSW	144	4	307		455
PT. BTS	1,838	1			1,839
PT. BTK 1		395			395
PT. BTK 2	55		48		103
PT. BSS	65	59			124
PT. BTJ	5,256	445			5,700
PT. CL II	68	57	66		190
PT. CPO		218			218
PT. CKK	2	0			2
PT. CUS	1,807	98			1,905
PT. CBP 1	5		3		8
PT. CPS 2	350	19			369
PT. CTU		2			2
PT. DP		22			22
PT. DR			5		5
PT. DYJ	131	11	1,442		1,585
PT. DSP 3		181			181
PT. DL	341				341
PT. SU		11			11
PT. FAP	12	0			12
PT. GKM		417			417
PT. GYP	13		30		43
PT. GMB		1			1
PT. HPHJ	0	168			169
PT. HSK 1	5	0			5
PT. HHK 3	225	31			256
PT. HSL 1	293	2			295
PT. HBA		48			48
PT. IGP 4			49		49
PT. IPM		423			423
PT. IK	52		273		325
PT. IKU		392			392
PT. JV	257	2	2,740		2,999
PT. KIP 1		71	23		94
PT. KAL 1	389	3	202		594
PT. KAL 2	729		155		884
PT. KBP 1		262			262
PT. KBA	4,154	662			4,816
PT. KPL	5,020	406			5,426
PT. KPC	900	47	2,080		3,026
PT. KAL	524	9	2,157		2,690
PT. KGP 3		7			7
PT. KRU	650	61			712
PT. KSA		64			64
PT. KAP	38	3			41
PT. KAA	5,660	0			5,660
PT. KMS		42			42
PT. KUD MKK	4,514	365			4,879
PT. KKAI	345	25			370
PT. LSMD	464	2	462		928
PT. LSM	681	69			750
PT. LAIK	39	0	533		573
PT. LS	4	0	31		35
PT. MPK		42			42

Name of HGU	Mineral		Peatland		Total (ha)
	Protection	Production	Protection	Production	
PT. MAP 1	3,353	52	17		3,422
PT. MAP 2	17	1	934		951
PT. MCA 2			76		76
PT. MSP 1	198	16	150		364
PT. MKK	325	197	2,147		2,668
PT. MST	213	35			248
PT. MKA 2	4				4
PT. MKS	251	1			252
PT. MSKA	89	154			243
PT. MSL			25		25
PT. MSLS	0	2,850			2,850
PT. MJP		316			316
PT. MPE 2		44			44
PT. MPE 4		273			273
PT. MAS	167	300			467
PT. NC 2	203		45		248
PT. PAS 2		104			104
PT. PAS 3		131			131
PT. PIP	1	73	2,981		3,055
PT. PA		57	49		107
PT. PKBJ. II		4			4
PT. PDK	421	103			524
PT. PANP		591			591
PT. PGM	0	233	2,585		2,818
PT. PC			1		1
PT. PMS	0	48			48
PT. PTS	683	71			754
PT. PM		570			570
PT. PLJ	2		25		28
PT. RP		13	128		141
PT. RNG II		18			18
PT. RAP 1		99			99
PT. RU	1,514	2,251	210		3,976
PT. SMS 1			45		45
PT. SDK 1		40			40
PT. SDK 4		274			274
PT. SDK 5	118	22	1,207		1,348
PT. SDK 6		40			40
PT. SKK 1	70	1,117			1,187
PT. SKK 2	513	229			742
PT. SKS 1	277	1,789			2,066
PT. SKS 2		712			712
PT. SM	7,760	314			8,075
PT. SS	6,173	727			6,900
PT. SSS		265			265
PT. SK 1	0	5			5
PT. SK 2		42			42
PT. SMN	592	814			1,406
PT. SISU 1	654	73			727
PT. SISU 2	20	35			55
PT. SISU 3	311	24			334
PT. SISA 1	81	37			118
PT. SISA 2	4	0	14		18
PT. SISM	894	84			978
PT. SISU	0	153			153
PT. SDK 4		46			46

Name of HGU	Mineral		Peatland		Total (ha)
	Protection	Production	Protection	Production	
PT. SKM	12	0	2,216		2,228
PT. SKP 2			66		66
PT. SKP 4			66		66
PT. SS 2	302	67	267		636
PT. SJAL	42	3			45
PT. SML 1	69	23			92
PT. SSS	6,245	59	3,971		10,275
PT. SPAS			31		31
PT. SD		88			88
PT. SMS	265	0			265
PT. SMP	874	88			962
PT. TBT		15			15
PT. TBSM		43			43
PT. TAS 1	4		30		34
PT. TAS 2			91		91
PT. TAP	972	508	1,197		2,678
PT. TJ		59			59
PT. WHH 1	793	108			902
PT. WHH 2	3,500	98	5,092		8,690
PT. YSS		213			213
PTPN XIII 18	0	3	39		42
PTPN XIII 20		359			359
Total	**82,113**	**26,699**	**62,271**		**171,084**

Efforts to conserve natural forests in concession areas that are not included in the directive of protection inside and outside forest areas are areas that are included in the REDD+ performance assessment area (performance-based payments/REDD+ RBP) in accordance with the Minister of Environment and Forestry Regulation No. 70/2017. Therefore, this conservation effort is eligible to receive incentives through the REDD+ *Result Based Payment* (RBP) scheme.

Likewise, local governments that conserve natural forests that are not included in the category of areas to be protected/preserved (protection directives) are also entitled to receive incentives through budget allocations for forestry and environmental development in accordance with Government Regulations. No. 46/2017 concerning Environmental Economic Instruments (IELH). The consistent implementation of this policy will be able to encourage the preservation of natural forests to run well. The existence of incentive funds will be able to assist area managers to improve the implementation of programmes and activities to control deforestation and forest degradation.

4.2.2. Concession Forest Degradation

The occurrence of forest degradation is caused by many things, including logging activities and conversion of forest land into plantation land. Forest degradation also contributes to the increase in GHG, so it is necessary to make efforts to prevent forest degradation. The implementation of GHG emission reduction actions head towards net sinks, and needs to be carried out in synergy between various parties, including concessions/companies.

One of the contributions from the concession can be made through preventing the degradation of primary forest into secondary forest in the concession area. At this time, the area of primary forest that still exists within the PBPH-HA and PBPH-HT

concession areas is 4.89 million hectares and 0.30 million hectares, respectively (Table 46).

Most of the PBPH-HA concessions that have extensive primary forest are generally located in the Provinces of West Papua, Papua, North Kalimantan with a total of 3.69 million hectares or about 75% of the total and are generally located on mineral lands. Meanwhile, the PBPH-HT concessions are mostly located in the provinces of Central Sulawesi, Papua, Maluku and West Kalimantan with a total area of around 0.212 million hectares or about 70% of the total, and generally located on mineral lands.

Table 46. Potential primary natural protection forest areas di PBPH-HA dan HT

Province	PBPH-HT			PBPH-HA		
	Mineral	Peatland	Total (ha)	Mineral	Peatland	Total (ha)
Bangka-belitung	4,165	75	4,240			-
Bengkulu			-	7,829		7,829
Gorontalo	425		425			-
Jambi	25,310	1,538	26,848		447	447
West Kalimantan	32,925		32,925	147,608		147,608
South Kalimantan	37		37	657		657
Central Kalimantan	72		72	232,024		232,024
East Kalimantan	20,817		20,817	473,733		473,733
North Kalimantan	387	812	1,200	996,830		996,830
Maluku	33,805		33,805	46,703		46,703
North Maluku	20		20	68,379		68,379
West Nusa Tenggara	1,589		1,589	2,560		2,560
East Nusa Tenggara	1,019		1,019			-
Papua	70,988	560	71,548	1,216,540	89,791	1,306,331
West Papua	68	5,631	5,699	1,307,535	84,787	1,392,322
Riau		4,276	4,276		3,784	3,784
West Sulawesi	21		21	16,156		16,156
Central Sulawesi	73,721		73,721	164,999		164,999
Southeast Sulawesi	19,870		19,870			-
North Sulawesi	159		159	10,564		10,564
West Sumatra	129		129	2,184		2,184
South Sumatra	726	388	1,114			-
North Sumatra	5,194		5,194	16,516		16,516
Total	**291,447**	**13,279**	**304,726**	**4,710,817**	**178,809**	**4,889,626**

Further analysis to see the distribution of locations that are still primary forests in each management unit, namely PBPH-HA and PBPH-HT concessions in North Kalimantan Province, respectively, can be seen in **Table 47** (with name concession declared in abbreviation). Based on the IBGF analysis, almost all primary natural forest areas in PBPH-HA areas are in low priority areas, namely IPL 2 and 3 (**Table 47**). This means that the area has a low level of threat (illegal logging). Meanwhile, in the PBPH-HT area, the IPL is rather low (4), but the IBGF emission is in the high category, which means the threat of deforestation is high.

Furthermore, the PBPH-HA concession with a very large area of primary forest in North Kalimantan Province is PT. ETB, and is 0.3 million hectares of the total concession area of 0.32 million hectares (

Table 49), the remaining 0.02 million hectares is secondary forest cover. There are no other land use areas (cultivated, plantation or built) within the concession which indicates that the area is far from residential centres or centres of economic activity. On the other hand, in PBPH-HT concessions, part of the concession area has been

occupied by the community, which is indicated by the existence of annual crop cultivation and plantation activities (**Table 50**).

Table 47. Companies with primary forests within PBPH-HA concession areas in North Kalimantan Province

Name of PBPH-HA	Priority Location Index (IPL)			Total (ha)
	2	3	7	
KSU MTI	1,461			1,461
PT. AL	2,719			2,719
PT. BKS	28,381			28,381
PT. CW	26,126			26,126
PT. DWL		2,429		2,429
PT. ET	301,241			301,241
PT. GSSM	24,976			24,976
PT. HKAP	4,193			4,193
PT. INH I Unit KS	43,211			43,211
PT. INH I Unit S		980		980
PT. INH I Unit SH		3,901		3,901
PT. INH II Unit M	2,274			2,274
PT. INH II Unit SS	40,290			40,290
PT. INH II Unit ST	80,079			80,079
PT. INH unit P	15,330			15,330
PT. IM	25,129			25,129
PT. IKH		20,105		20,105
PT. KJP	83			83
PT. KBT		3,630		3,630
PT. MSI	19,722			19,722
PT. PBA			8,896	8,896
PT. RKR		115,255		115,255
PT. RMS	27,269			27,269
PT. STB	10,143			10,143
PT. SJ	69,261			69,261
PT. SLJ Ii		110,244		110,244
PT. WAM	9,504			9,504
Total	**731,390**	**256,544**	**8,896**	**996,830**

Table 48. Companies with primary forests within PBPH-HT concession areas in North Kalimantan Province

Nama Perusahaan	IPL	Mineral	Peatland	Total (ha)
PT AHL	4	387	812	1,200
Total		**387**	**812**	**1,200**

Table 49. Land cover conditions in PT. ETB of North Kalimantan Province

Nama PBPH-HA	PL2019_Rev	Mineral	Peatland	Total (ha)
PT ETB	Hutan Primer	301,241	0	301,241
	Hutan Sekunder	17,530	0	17,530

Total		**318,770**	**0**	**318,770**

Table 50. Land cover condition in PT. AAL of North Kalimantan Province

Unit Kelola	Tutupan Lahan	Mineral	Peatland	Total (ha)
PT AAL	Hutan Primer	387	812	1.200
	Hutan Sekunder	64,279	9,743	74.021
	Hutan Tanaman	36,330	11,319	47.649
	Perkebunan	17,117	287	17.403
	Budidaya	11,833	18	11.851
	Terbangun	6,781		6.781
	Tidak Produktif	60,411	1,559	61.970
	Lainnya	5	50	55
Total		**197.142**	**23,788**	**220,930**

Protecting primary natural forest in the concession from logging, based on IJLH, the forest is included in the production direction, and there are efforts to prevent degradation that can receive incentives from the RBP-REDD + scheme in accordance with Minister of Environment and Forestry Regulation No. 70/2017. The expansion of the implementation of the moratorium on primary natural forests from logging or conversion to concession areas needs to be carried out with an incentive system. Here large determined incentives for concessions that implement primary forest conservation policies as part of the implementation of the Minister of Environment and Forestry Regulation No. P 70/2017 need to consider the IPL, where the higher the IPL the greater the value of the incentives provided.

4.2.3. Plantation Forest Development

Within the PBPH-HT area, there is a potential expansion of plantation forest on unproductive land of 1.8 million ha (Table 51). In addition to unproductive land, there is cultivation land seasonal crops and plantations that have been utilised by the community which also have the potential to be developed as plantation forests. The area of unproductive land in the PBPH-HT area is quite high but has not been used for plantation forest development. This condition is thought to be due to tenure conflicts with the community. Resolving land issues in concessions with communities requires high social costs. Therefore, the option that can be chosen to encourage the actualisation of plantation forest development is to apply a multi-business scheme that allows for agroforestry patterns on cultivated land (0.41 million ha) and plantations (0.04 million ha) located within the PBPH area (Table 52). The development of plantation forests on cultivated land and plantations through agroforestry will have a lower number of plantation forests, which is about 30% lower than normal. This means that the effective land for plantation forest on cultivation and plantation land is 0.45 million hectares (Table 52), only about 0.15 million hectares is used, where in total the potential area for plantation forest development is 1.5 million hectares.

Utilisation of 1.35 million hectares of unproductive land (Table 52) which has the potential to have conflict (claimed by the community), can be carried out through a forestry partnership scheme as stated in the Minister of Environment and Forestry Regulation No. 9/2021. The profit-sharing arrangement in forestry partnerships is determined by the presence of assets/capital from the permit holder, where for areas that already have assets/capital from the permit holder, the proportion of profit sharing is 80% for the permit holder and 20% for the community, otherwise if there

are assets / capital from the community, the profit-sharing ratio will be 80% for the community and 20% for permit holders.

If there are no assets in the forestry partnership area, the profit-sharing proportion is 50:50 or according to the agreement between the community and the company. The existence of this policy can help resolve land conflicts and accelerate the realisation of plantation forest development within the PBPH-HT concession area.

Table 51. Potential of plantation forest expansion in PBPH-HT areas

Province	Plantation	Cultivation	Non-productive	Total (ha)
Aceh	252	2,689	46,130	49,070
Bangka-belitung	2,764	5,024	63,144	70,932
Gorontalo		2,702	10,832	13,534
Jambi	16,215	78	45,999	62,292
West Kalimantan	1,688	371,157	126,412	499,257
South Kalimantan	1,716	2,491	62,072	66,279
Central Kalimantan	2,984	1,131	103,452	107,567
East Kalimantan	6,810	5,355	446,411	458,577
North Kalimantan	1,004	1,471	46,473	48,948
Lampung	1	605	1,633	2,239
Maluku		0	47,847	47,847
North Maluku		133	5,447	5,580
West Nusa Tenggara		2,692	4,319	7,011
East Nusa Tenggara		1,227	4,913	6,140
Papua	4,348	242	106,171	110,761
West Papua	18		775	793
Riau	2,502	27	22,648	25,178
West Sulawesi		0	3,303	3,304
South Sulawesi		46	2,352	2,398
Central Sulawesi	0	887	14,788	15,676
Southeast Sulawesi	3	171	10,031	10,205
North Sulawesi		0	704	704
West Sumatra	1,322	153	4,653	6,128
South Sumatra	57	2,498	154,906	157,461
North Sumatra	2,694	5,096	11,012	18,801
Total (ha)	**44,379**	**405,875**	**1,346,427**	**1,796,681**

[1] *Note: Only areas that are included within production directional use on mineral land*

Based on the IPL, the distribution of unproductive land areas in the PBPH-HT is in high priority areas (IPL 7-9) around 35.6%, medium (IPL5-6) around 36.1% and low (IPL 1-6). 4) about 28.3%.

Based on this condition, the concessions can be said to be not performing well due to the high amount of unproductive land that has not been used for plantation development. On the other hand, PHL certification status is good. To encourage the acceleration of plantation forest development, the assessment of concession certification needs to be linked to the company's performance in the utilisation of the area. In addition, domestic timber market policies must also continue to be developed to attract and increase investment.

The highest area in IPL 7-9 is in East Kalimantan Province, reaching 0.251 million hectares spread over 16 concessions (

Table 54).

Of the 16 concessions, there are 2 concessions that are classified as extreme high priority (IPL 9), 2 concessions are classified as very high priority (IPL 8) and 12 concessions are classified as high priority (IPL 7). Viewed in more detail, in 1 of the concessions, namely PT AAU, the area of unproductive land which reaches 18,618 ha occupies more than 50% of the concession area. Within the concession, the area occupied by the community is still very low, namely only 7 ha, which indicates that in this area the potential for land conflicts is still low.

Table 52. Distribution of plantation forest development potential on non-productive land within the PBPH-HT areas by priority location

Prrovince	Location Priority Index (IPL)			Total (ha)
	1-4	5-6	7-9	
Aceh	46,073	57	-	46,130
Bangka-belitung	26,519	36,626	-	63,144
Gorontalo	10,832	-	-	10,832
Jambi	568	45,350	81	45,999
West Kalimantan	12,142	26,283	87,987	126,412
South Kalimantan	10,030	41,446	10,596	62,072
Central Kalimantan	-	68,910	34,542	103,452
East Kalimantan	47,366	183,900	215,146	446,411
North Kalimantan	41,072	5,400	-	46,473
Lampung	1,539	94	0	1,633
Maluku	26,638	21,209	-	47,847
North Maluku	5,447	-	-	5,447
West Nusa Tenggara	1,936	2,383	-	4,319
East Nusa Tenggara	4,770	142	-	4,913
Papua	106,171	-	-	106,171
West Papua	775	-	-	775
Riau	475	1,634	20,540	22,648
West Sulawesi	3,303	-	-	3,303
South Sulawesi	2,352	-	-	2,352
Central Sulawesi	14,788	-	-	14,788
Southeast Sulawesi	10,031	-	-	10,031
North Sulawesi	704	-	-	704
West Sumatra	4,653	-	-	4,653
South Sumatra	544	44,472	109,889	154,906
North Sumatra	1,675	8,703	634	11,012
Total (ha)	**380,402**	**486,610**	**479,415**	**1,346,427**

[1] *Note: Only areas that are included within production directional use on mineral land*

Table 53. Distribution of non-productive and agricultural lands for plantation forest development potential within the PBPH-HT areas in East Kalimantan Province

Name of PBPH-HT concession	IPL	Plantation	Cultivation	Non-productive	Total (ha)
PT. AAU	9	7		18,618	18,625
PT. SHJ	9	813	1,411	21,803	24,027
PT. BS	8	1	282	5,334	5,618
PT. DHM	8	7		21,452	21,459
PT. FSW	7		0	7,553	7,554
PT. HK	7	21		3,575	3,596
PT. Inhutani I BM	7			4,726	4,726
PT. Inhutani I LN	7		12	44,193	44,206
PT. Inhutani I M	7	1		704	705
PT. IHM	7	266	63	26,004	26,333
PT. KWL I	7			4,225	4,225
PT. MKC	7			5,153	5,153
PT. PBA	7		194	38,403	38,597
PT. SAK	7	2		12,147	12,149
PT. SAL I	7		233	299	533
PT. SHJ Ii	7		194	956	1,150
Total (Ha)		**1,118**	**2,390**	**215,146**	**218,653**

[1] *Note: Only areas that are included within production directional use on mineral land.*

Table 54. Land cover condition of PT. AAU in East Kalimantan Province

Name of PBPH-HT	Land Use	Total (ha)
PT AAU (SK 87)	Natural forest	1,144
	Plantation forest	12,647
	Plantation	7
	Non-productive	18,618
	Total (ha)	**32,416**

Referring to the NDC target, the potential area for plantation forest development within the concession, which is around 1.5 million hectares, is still far from sufficient. The land allocated for social forestry which has the potential for the development of Community Plantation Forests (HTR) is not very high at around 0.7 million hectares (

Table 55). So, in total the potential area for plantation forest development in concession areas and social forestry is only about 2.2 million hectares while the NDC and LTS targets reach 5.7 million hectares. From the distribution of potential land locations for plantation forest development in social forestry areas, the largest area is in Central Kalimantan Province, which covers 0.122 million hectares. From this area, those who have received HTR permits are very low, while those that are still indicative are more than 50% of the total area (**Table 56**). In general, how many areas are still indicative of KPHPs that are included in Typology 1, namely FMUs with good institutional capacity and high social capital . This means that this area is very suitable for the PS location. When viewed in more detail, the most suitable areas for HTR PS are in KPHP Units XXV, XXX and XXXI (

Table 57) and efforts to accelerate and facilitate permit issuance are needed.

Table 55. Distribution of potential locations for Community Forest development in PIAPS KPHP by priority location index

Province	IPL			Total (ha)
	1-4	5-6	7-9	
Aceh	24	5	-	28
Bangka-belitung	18,614	9,126	-	27,740
Bengkulu	1,409	7,345	-	8,754
Special Region of Yogyakarta	6	-	-	6
Gorontalo	6,580	-	-	6,580
Jambi	130	15,681	734	16,545
West Kalimantan	7,431	11,863	7,554	26,847
South Kalimantan	2,190	4,911	7,394	14,495
Central Kalimantan	623	31,380	90,590	122,594
East Kalimantan	20,119	21,243	3,264	44,625
North Kalimantan	13,122	7,585	-	20,707
Kepulauan Riau (Islands of Riau)	27,556	-	-	27,556
Lampung	2,709	184	-	2,893
Maluku	24,579	3,375	-	27,954
North Maluku	9,970	-	-	9,970
West Nusa Tenggara	1,871	1,031	-	2,902
East Nusa Tenggara	11,129	2,205	-	13,333
Papua	184,999	19,459	-	204,458
West Papua	7,861	-	-	7,861
Riau	9,346	1,249	5,092	15,687
West Sulawesi	492	-	-	492
South Sulawesi	7,048	2,471	-	9,519
Central Sulawesi	13,053	-	-	13,053
Southeast Sulawesi	23,544	4,862	-	28,406
North Sulawesi	3,033	188	-	3,221
West Sumatra	4,347	-	5	4,351
South Sumatra	5,952	10,336	1,408	17,696
North Sumatra	12,711	6,915	-	19,626
Total (ha)	**420,446**	**161,415**	**116,041**	**697,901**

[1] *Note: Only areas that are included within production directional use on mineral land.*

Table 56. Distribution of non-productive lands on PIAPS area in Central Kalimantan Province by priority location index

Group of PS	FMU Typology	Location Priority Index (IPL)			Total (ha)
		1-4	5-6	7-9	
Non-HTR	1	0	0	4,494	4,494
	2	0	27	773	799
	3	0	0	0	0
	4	0	133	0	133
HTR	1	0	114	511	624
	2	0	0	248	248
	3	0	0	0	0
	4	0	2,614	0	2,614
Process'proposed PS	1	0	0	57	57
	2	0	44	0	44
	3	0	0	0	0
	4	0	280	0	280
Indicative for PS	1	223	2,542	65,520	68,284
	2	0	5,383	16,437	21,820
	3	0	0	2,248	2,248
	4	401	20,243	303	20,947
TOTAL (ha)		**623**	**31,380**	**90,590**	**122,594**

[1] *Note: Only areas that are included within production directional use on mineral land.*

Table 57. Distribution of non-productive lands in KPHP Typology 1 in Central Kalimantan Province

KPHP	IPL			TOTAL (ha)
	1-4	5-6	7-9	
Unit X	0	-	1,276	1,276
Unit XIII	0	252	246	498
Unit XIV	0	195	0	195
Unit XIX	0	0	1,974	1,974
Unit XVI	223	0	0	223
Unit XVII	0	0	4,891	4,891
Unit XX	0	0	1,289	1,289
Unit XXI	0	2,095	0	2,095
Unit XXII & XXVI	0	0	440	440
Unit XXIV	0	0	434	434
Unit XXIX	0	0	1,470	1,470
Unit XXV	0	0	23,031	23,031
Unit XXX	0	0	14,808	14,808
Unit XXXI	0	0	15,660	15,660
TOTAL (ha)	**223**	**2,542**	**65,520**	**68,284**

4.2.4. Sustainable Forest Management

Based on forest quality conditions and IJLH directional use, areas with land cover as natural forest but in the direction of conversion and rehabilitation indicate that the forest condition has experienced severe degradation or is already in the form of thickets so that it becomes the main target area for enrichment activities (enhanced natural regeneration, ENR). Meanwhile, areas with primary natural forest cover that are included in the production direction and are located in PBPH-HA concessions have the potential to implement RIL (primary forest) and in the forest natural secondary with SILIN (Tebang Pilih Tanam Rumpang, Tebang Pilih Tanam Jalur).

PBPH-HT areas with natural forest can be managed using the TPTI system using RIL and SILIN techniques. It is possible for PBPH-HT concession holders to do this with the existence of a forestry multi-business policy. In this regard, there should be an obligation for concessionaires to carry out ENR efforts in these heavily degraded areas as part of the PHL certification assessment. Indicator 2.4 can be established as a mandatory indicator in the certification assessment.

Template analysis; the area in the concession which is potential for RIL and ENR implementation is almost 13 million hectares, whereas for RIL and SILIN implementation it is 12.6 million hectares while the ENR is around 0.313 million hectares (Table 58). Enrichment activities (ENR) are one of the mitigation activities that are expected to increase the rate of natural forest regeneration. Mitigation efforts, by increasing the rate of GHG absorption through ENR, have a major contribution in achieving the NDC target and also the 2030 net sink. In the scenario towards net sink 2030, the rate of secondary forest regeneration through enrichment in the concession area of 0.313 million hectares reaches 2.5 tC/ha/year.

Based on the threat level, the natural forest area in KPHP and KPHL outside concessions with IPL 5-9 (moderate to extreme high threat level) reaches 3.3 million hectares (Table 59). Of this area, about 22% are in high priority areas (IPL7-9) and 78% in medium-to-high priority (Table 60). Areas with a high level of threat need to be prioritised to become areas for forest ecosystem restoration permits. It is hoped that the condition of the forest can be maintained and the natural regeneration process goes well. In the 2030 net sink scenario, the target area for restoration permits is specifically for non-concession KPHL and KPHP areas. In fact, RHL activities are activities not only for mitigation and carbon purposes, but to overcome critical lands

that can be localities so that RHL is also carried out in other areas according to field needs not only as Table 59 so that it can add to mitigation efforts.

Table 58. Areas within forest concessions with potential implementation of RIL, SILIN and enrichment (*Enriched Natural Regeneration, ENR*) activities

Province	RIL/SILIN		ENR
	PBPH-HA (ha)	PBPH-HT (ha)	PBPH-HA / PBPH-HT (ha)
Aceh	4,488	12,296	2,428
Bali	-	-	2,515
Bangka-belitung	-	41,443	170
Banten	-	-	723
Bengkulu	414	-	474
Special Region of Yogyakarta	-	-	4
Gorontalo	-	31,570	295
Jambi	-	14,293	2,620
West Java	-	-	952
Central Java	-	-	1,971
East Java	-	-	827
West Kalimantan	80,838	96,823	5,780
South Kalimantan	94,069	85,705	6,406
Central Kalimantan	467,495	23,795	17,589
East Kalimantan	1,607,303	199,083	6,081
North Kalimantan	1,928,719	66,690	4,456
Kepulauan Riau (Islands of Riau)	-	-	890
Lampung	-	84	1,773
Maluku	724,598	103,878	4,227
North Maluku	492,385	23,794	1,128
West Nusa Tenggara	18,945	26,171	16,252
East Nusa Tenggara	-	24,761	105,845
Papua	2,367,161	424,576	49,423
West Papua	2,911,270	51,984	30,459
Riau	7	6,670	7,511
West Sulawesi	6,139	2,402	1,659
South Sulawesi	-	5,460	11,594
Central Sulawesi	199,733	100,159	6,172
Southeast Sulawesi	-	30,950	3,418
North Sulawesi	23,043	1,998	1,702
West Sumatra	115,743	21,367	1,593
South Sumatra	-	11,845	875
North Sumatra	113,669	20,110	15,286
Total (ha)	**11,156,021**	**1,427,904**	**313,097**

Table 59. Total non-concessions areas within KPHL and KPHP with potential licenced areas for ecosystem restoration with natural regeneration in priority location 5-9

Province	KPHL	KPHP	Total (ha)
Aceh	91	0	91
Bangka-belitung	16,810	13,513	30,323
Bengkulu	64,200		64,200
Jambi	8,417	92,355	100,772
West Kalimantan	128,373	496,142	624,516
South Kalimantan	130,535	178,242	308,777
Central Kalimantan	170,180	940,181	1,110,361
East Kalimantan	4,668	48,565	53,233
Kepulauan Riau (Islands of Riau)		6,897	6,897
Lampung	22,146	4,103	26,249
Maluku	3,796		3,796
West Nusa Tenggara	2,598		2,598
East Nusa Tenggara	127,856	9,057	136,913
Papua	56,008	94,084	150,092
West Papua		21,361	21,361
Riau	27,267	294,903	322,171
South Sulawesi	36,739	25,712	62,452
Southeast Sulawesi	2,668		2,668
North Sulawesi	16,048		16,048
West Sumatra	797	2,322	3,119
South Sumatra	89,638	60,354	149,992
North Sumatra	32,043	80,372	112,415
Total (ha)	**940,880**	**2,368,165**	**3,309,045**

Table 60. Total area of secondary forests on non-concession KPHL dan KPHP areas by priority location index (5-9)

Province	Priority Location Index (IPL)					Total (Ha)
	5	6	7	8	9	
Aceh	0	91				91
Bangka-belitung	10,274	20,049				30,323
Bengkulu	20,975	42,425	800			64,200
Jambi	63,724	12,591	23,962	495		100,772
West Kalimantan	326,063	220,337	43,245	34,871		624,516
South Kalimantan	204,024	98,165	6,588			308,777
Central Kalimantan	535,090	296,837	175,702	102,732		1,110,361
East Kalimantan	3,402		27,639	1,176	21,016	53,233
Kepulauan Riau (Islands of Riau)	6,897					6,897
Lampung	23,639	38	2,572			26,249
Maluku	3,796					3,796
West Nusa Tenggara	2,598					2,598
East Nusa Tenggara	106,815	30,099				136,913
Papua	94,084	56,008				150,092
West Papua		21,361				21,361
Riau	24,144	53,977	160,842	43,476	39,731	322,171
South Sulawesi	62,452					62,452
Southeast Sulawesi	2,668					2,668
North Sulawesi	16,048					16,048
West Sumatra	215	797	1,761	346		3,119
South Sumatra	41,375	75,756	5,338	27,499	24	149,992
North Sumatra	56,716	50,185	5,514			112,415
Total (ha)	**1,605,000**	**978,715**	**453,964**	**210,595**	**60,770**	**3,309,045**

4.2.5. Rotational and Non-rotational Rehabilitation

One of the mitigation actions to reduce the rate of deforestation and land degradation is through land rehabilitation. Rehabilitation inside and outside forest areas, hereinafter referred to as RHL, is an effort to restore, maintain and improve forest and land functions so that their carrying capacity, productivity and role in supporting life support systems are maintained.

The purpose of implementing RHL is to reduce deforestation/forest and land degradation and restore damaged/critical lands so that they can function as production media and water management media. RHL activities for the restoration of production functions within the NDC are referred to as rotational land rehabilitation activities, while those for water management functions and other environmental services are non-rotational land rehabilitation activities.

4.2.5.1. Non-rotational Rehabilitation

Non-rotational rehabilitation activities can be prioritised in several areas such as PBPH because it has the largest area of up to 0.7 million ha with a very high category. When viewed from the aspect of responsibility, it is known that most of the potential for non-rotational rehabilitation is the responsibility of the Central Government (in this context, the Ministry of Environment and Forestry) which is 99%, and the remaining 1% is the responsibility of the Regional Government.

However, in its implementation in the field, good co-ordination is needed between the Central Government (KLHK) and the local government. Based on the results of the analysis, it is known that the area of land that has the potential to be rehabilitated is around 12.69 million ha, with land that has a high priority level (IPL: 7-9) covering an area of 1.78 million ha (Table 61). This area is lower than the target, so it is necessary to include areas with a medium-to-slightly high priority index (IPL5-6).

Table 61 shows that the largest area for non-rotational rehabilitation is in the area of production forest that has not been granted a permit and the area of PBPH-HT as well as social forestry areas. The total area of these three target areas is 50%. Areas outside conservation and protection forest areas that are the target of rehabilitation activities without rotation generally have high conservation value because they are likely to be crossing areas for animals. When viewed from the aspect of the person in charge, most of the potential for rehabilitation for non-rotation is the responsibility of the MoEF which is 60.2%, and the private sector is 24.0%, the community and local government with the support of the central government are around 15.8%, and local governments with support from the central government around 15.8%.

Furthermore, the determination of the priority location for this rehabilitation activity is assessed based on the condition of the critical land and the restored watershed. This refers to the Regulation of the Minister of LHK No. P.2/MENLHK/SETJEN/KUM.1/1/2020, where the priority for the implementation of RHL is on critical land, open land and/or ex=burnt land and also pays attention to the level of disaster-prone and watershed status as priority watershed that needs to be restored which is a water catchment area for lakes, dams, or reservoirs including river banks and can also be national tourist destinations or certain ecosystems such as mangroves and peat. In this Ministerial Regulation, open land is land whose cover is in the form of shrubs or low carbon reserves with a number of trees of less than 200 trees per hectare. In addition, the selection for RHL locations also pays attention to disaster-prone maps and also the status of the watershed as a priority watershed that needs to be restored, which is a water catchment area for lakes, dams, dams or reservoirs including borders and can also be national tourist destinations or certain ecosystems such as mangroves and peatland.

Table 61. Potential non-rotational rehabilitation areas with high IPL (7, 8 and 9)

Province	KPHP					KPHL Non	KPHL	Konservasi	APL		Total (ha)
	Non Konsesi	PBPH HT	PBPH HA	PBPH RE	PIAPS	PIAPS	PIAPS		Non-HGU	HGU	
Bengkulu	-					2,889	17,574		2,138		22,601
Jambi	1,429	51,668		9,259	5,478	-		32,019	74	0	99,927
West Kalimantan	34,811	49,472	13		7,670	-		136,758	5,833	4,113	238,670
South Kalimantan	8,922	14,096			538	1,372		6,180	105	104	31,317
Central Kalimantan	117,106	19,962		146	58,561	39,519	7,181	133,79	25,429	6,447	408,141
East Kalimantan	24,750	25,090	84		34	5,706	1,057	160,925	35,695	5,575	258,916
North Kalimantan	-					-				2	2
Lampung	6,470					60		3,418	3		9,951
Riau	98,440	89,525	2,627	2,573	86,102	-	3,064	94,032	5,363	17,247	398,972
West Sumatra	2,145				211	-	3				2,359
South Sumatra	45,740	113,733		6,666	9,43	22,973	67	71,427	10,425		280,461
North Sumatra	200	9,576			12	21,564	54		5		31,212
Total (ha)	**339,814**	**373,123**	**2,724**	**18,644**	**168,036**	**94,082**	**29,000**	**638,548**	**85,070**	**33,488**	**1,782,530**

Note: The target locations for non-rotational rehabilitation in production forest and APL areas are areas which according to IJLH are included in the directional use of rehabilitation and protection, both on mineral and peatland..

The target locations for non-rotational rehabilitation in Production and APL forest areas are areas which according to IJLH are included in the direction of rehabilitation and protection, both on mineral and peat land..

Table 62. Priority non-rotational rehabilitation on critical lands and restored catchments (IPL 7-9)

Province	KPHP					KPHL non PIAPS	KPHL-PIAPS	Konser-vasi	APL		Total (ha)
	Non Konsesi	PBPH HT	PBPH HA	PBPH RE	PIAPS				Non HGU	HGU	
Bengkulu						2,850	14,665		450		17,965
Jambi	473	20,429		8,767	4,750			1,449	66		35,934
West Kalimantan	15,097	6,489			2,502			1,589	726	882	27,285
South Kalimantan	5,275	1,097			97	189			1		6,658
Central Kalimantan	21,007	2,325		110	22,663	98		27,827	2,140	722	76,891
East Kalimantan	5,870	19,209	49		8	4,402	1,057	**54,967**	6,599	1,033	93,193
Lampung	5,091					46		3,418			8,555
Riau	42,701	30,040			36,652		3,044	72,561	657	144	185,799
West Sumatra	2,016				211		3				2,230
South Sumatra	1,316	99,726		73	7,627	22,203	66	71,358	3,018		205,387
North Sumatra		8,573				19,434	5		5		28,017
Total (ha)	**98,847**	**187,887**	**49**	**8,949**	**74,510**	**49,223**	**18,839**	**233,170**	**13,659**	**2,781**	**687,914**

Note: The target locations for non-rotational rehabilitation are areas which according to IJLH are included in the directional use of rehabilitation and protection, both on mineral and peatland..

More detailed information on KPHP Unit XXXI with the largest non-rotational rehabilitation target area can be seen in **Table 64.** Unit XXXI is a KPHP with typology 1, meaning that the institutional capacity is strong and social capital is also strong (the section of this area already occupied by the community is high). High IBGF Emission and IBGF Absorption and moderate IBGF Fire. Unit XXXI-KPHP has an area of 0.246 million hectares of which about 80% is peatland Table 64).

Only 16% of the area is still natural forest and almost all of it is a protected area. About 70% is unproductive land and more than 20,000 hectares have been occupied by the community . In this area there are no PBPH-HT, PBPH-HA or PBPH-RE concessions, and what is new is a social forestry permit which covers an area of only about 15,000 hectares and about 5,000 hectares is indicative of PIAPS. The threat level of natural forest areas for conversion in FMUs is very high so that they need to be targeted areas for programmes from various related directorates, both in handling tenure issues, setting boundaries, peat restoration, land rehabilitation, and acceleration of social forestry development.

Table 63. Total priority areas for non-rotational rehabilitation in non-concession KPHP in Central Kalimantan Province

Unit KPH	Typology	IPL	Plantation	Cultivation	Non-productive	Total (ha)
VII - KPHP	2	7	0	171	2,654	2,826
XIV - KPHP	1	7	0	30	432	462
XIX - KPHP	1	7	147	86	3,734	3,966
XV - KPHP	2	7	11	56	241	308
XVIII - KPHP	3		1	249	9,270	9,520
XX - KPHP	1	8	107	33	14	153
XXII, Unit XXVI - KPHP	1	7	2,626	773	2,829	6,227
XXIX - KPHP	1	7	8	124	779	912
XXV - KPHP	1	8	121	9	1,832	1,962
XXVII - KPHP	2	8	89		1,943	2,032
XXVIII - KPHP	2	7	544	1,093	3,223	4,860
XXXI - KPHP	1	8	7	2,213	16,422	18,642
Wilayah Non KPHP			8,046	11,351	45,839	65,236
Total (ha)			**11,708**	**16,187**	**89,211**	**117,106**

Table 64. Land cover distributon of Unit XXXI-KPHP in Central Kalimantan Province

Unit KPH	Directional Use	PL 2019	Mineral	Peatland	Total (ha)
UNIT XXXI - KPHP adalah dengan Tipologi 1 dan masuk prioritas sangat tinggi (IPL 8) karena berada di wilayah dengan IBGF emisi dan IBGF serapan tinggi, dan IBGF kebakaran sedang	**Conversion**	Cultivation	8,702		8,702
		Plantation	7,011	5,513	12,525
		Built	251		251
		Non-productive	227	339	565
	Protection	Cultivation	0	77	77
		Natural Forest	10,937	30,282	41,219
		Others (Water)	6	1	7
		Plantation	0	102	102
		Built	252		252
		Non-productive	15,936	110,130	126,066
		Non-productive*	0	4,790	4,790
	Production	Cultivation	35		35
		Natural Forest	3		3
		Others (Water)	0		0
		Plantation	1,263		1,263
		Built	85		85
		Non-productive	23,157	0	23,157
	Rehabilitation	Cultivation	2,212	8,358	10,570
		Others (Water)	1,717	1,146	2,863
		Plantation	7	56	63
		Built	2,249	0	2,249
		Non-productive	97	3,505	3,602
		Non-productive*	512	6,612	7,124
	Total (ha)		**74,659**	**170,914**	**245,572**

*Note: *non-productive areas located in restored watershed and critical lands. Non-productive,,cultivation and plantations areas on peatlands that are the targets of peatland restoration. The total area of KPHP reaches 245,000 ha. These areas do not include concession areas and areas with production and conversion directional uses*.

Furthermore, in the PBPH-HT area, the priority area for non-rotational rehabilitation reaches 0.373 million hectares and almost a third of it is in South Sumatra (see **Table 65**). The priority areas for the implementation of non-rotational rehabilitation in this province are spread over 10 concessions and PT. MHP is the widest, reaching 68% of the total area (**Table 66**). The total concession area of PT. MHP is very wide, reaching 0.328 million hectares spread over 5 KPHP units with institutional typologies 1 and 2. There are very few areas that are still natural forest. The area that has been used for plantation forest development reaches more than 0.120 million hectares (35%), and the rest is land for seasonal agricultural cultivation (39%), unproductive (20%), and the rest is plantations. The widest utilisation for cultivation according to IJLH is in the direction of conversion, which means that the community has occupied the area for a long time (more than 20 years). The largest unproductive land is in the rehabilitation direction which shows this area has a high conservation value (animal crossing). Efforts to rehabilitate unproductive land or those that have been used by the community through forestry partnerships can be expected to increase the actualisation of plantation forest development.

Table 65. Priority non-rotational rehabilitation in PBPH-HT of South Sumatra Province by land use (IPL 7-9)

PBPH HT	IPL	Plantation	Cultivation	Non-productive	Total (ha)
PT BSS	7	1,093	25	2,294	3,411
PT BAP	8			5,804	5,804
PT BMH	8	451	2	4,841	5,293
PT BSP (SK 688)	9	720	5,549	5,176	11,445
PT CMBS	8	490		84	574
PT MHP	7	1,895	32,247	43,372	77,513
PT RHM (SUMSEL)	8		1	6,376	6,377
PT SHP	8			840	840
PT WAM	7		1,409	812	2,221
PT WLMS	8			255	255
Total (ha)		**4,648**	**39,233**	**69,851**	**113,733**

Table 66. Area distribution of PT MHP (PBPH-HT) in South Sumatra Province by land cover and IJLH directional use

PBPH HT	Directional Use	PL 2019	Mineral	Peatland	Total (ha)
PT MHP is classified as having high priority (IPL 7) the high emission push factor is fires	**Conversion**	Hutan Tanaman	1	0	1
		Perkebunan	7,503	0	7,503
		Budidaya	98,457	0	98,457
		Terbangun	740	0	740
		Tidak Produktif	1,803	0	1,803
		Lainnya (Air)	0	0	0
	Protection	Hutan Tanaman	12,761	0	12,761
		Terbangun	29	0	29
		Tidak Produktif	715	584	1,299
		Tidak Produktif*	1,656	98	1,754
	Production	Hutan Alam	4	0	4
		Hutan Tanaman	63,393	0	63,393
		Perkebunan	1	0	1
		Budidaya	8	0	8
		Tidak Produktif	21,318	0	21,318
		Lainnya (Air)	0	0	0
	Rehabilitation	Hutan Tanaman	45,003	0	45,003
		Perkebunan	1,895	0	1,895
		Budidaya	30,626	0	30,626
		Terbangun	841	0	841
		Tidak Produktif	2,046	0	2,046
		Tidak Produktif*	38,955	59	39,014
	Total (ha)		**327,755**	**741**	**328,496**

*Note: * rehabilitation areas in restored watershed and are critical lands*

Furthermore, the PBPH-HA concession area which has the highest non-rotational land area for rehabilitation is in Riau Province, which is spread over two PBPH-HA concessions (**Table 67**), and the widest at PT. DRT. A more detailed analysis of this concession shows that the company has a total area of about 86,860 hectares of which about 94% is peatland and about 65% is still natural forest (**Table 68**). The rest is in the form of annual crop cultivation areas and plantations. Most of the agricultural land is in the area that is included in the rehabilitation direction which is an essential ecosystem area (peat) so that it needs to be prioritised for restoration. Companies can develop forestry partnerships with communities to carry out peat restoration, especially the paludiculture pattern, and other possible silviculture techniquebased on silviculture technology.

Table 67. Priority non-rotational rehabilitation in PBPH-HA of Riau Province (IPL 7-9)

PBPH-HA	IPL	Plantation	Cultivation	Non-productive	Total (ha)
PT DRT	7	247	38	2,090	2,376
PT MSK	7	3	0	249	252
Total (ha)		**250**	**39**	**2,339**	**2,627**

Table 68. Area distribution of PT DRT (PBPH HA) in Riau Province by land cover and IJLH directional use

PBPH-HA	Directional Use	PL 2019	Mineral	Peatland	Total (ha)
PT DRT is classified as area with high priority (IPL 7) with high IBGF Emission and Fire, but low IBGF Absorption; located within Unit I and II of KPHP Typology 1.	**Conversion**	Natural forest	0		0
		Plantation	988	1,357	2,345
		Cultivation	25		25
		Non-productive	1	27	27
	Protection	Natural forest	1,191	50,215	51,406
		Plantation forest		5,069	5,069
		Plantation	1	4	4
		Cultivation	8	1,243	1,251
		Non-productive	1,983	3,092	5,075
	Production	Natural forest	5		5
		Cultivation	1		1
		Non-productive	134		134
	Rehabilitasi	Natural forest	326	4,367	4,693
		Plantation forest	0	2	2
		Plantation	247	13500	13,746
		Productive	107	2,202	2,309
		Non-productive*	0	189	189
		Cultivation	31	410	440
		Others (water)	129	10	139
	Total (ha)		**5,177**	**81,687**	**86,860**

*Note: * rehabilitation areas in restored watershed and are critical lands*

Referring to **Table 61**, non-productive land in the non-PIAPS KPHL area is relatively large located in Central Kalimantan Province which is located in two KPHL Units (Table 69) and the widest is in XXXII (**Table 69**). By detail; condition cover land in Unit XXXII-KPHL is presented in **Table 70**, and is mostly non-

productive land in this KPHL including category critical and not entered until the watershed is restored. Land area is non-productive in this KPHL unit and has experienced enough improvement during 2016-2019 period. This showed existing land becoming critical, and instruction for protected areas on mineral land in 2016 that are still natural forest is about 18,969 ha (**Table 70**)..

Likewise, existing land becoming cultivated and plantations by instruction protect which means level acquisition. In accordance with incoming IPL category high, this KPHL area needs to get priority in implementation action mitigation.

Table 69. Priority non-rotational rehabilitation in Non PIAPS-KPHL in Central Kalimantan Province by land cover (IPL 7-9)

KPHL Unit	Typology	IPL	Plantation	Cultivation	Non-productive	Total (ha)
Unit IV-KPHL	1	7			342	342
Unit XXXII-KPHL	3	8	847	6,609	31,722	39,177
Total (ha)			**847**	**6,609**	**32,064**	**39,519**

Table 70. Area distribution of XXXII Non PIAPS-KPHL by land cover in Central Kalimantan Province

FMU Unit	Directional Use	PL 2019	Mineral	Peatland	Total (ha)
UNIT XXXII – KPHL is a Typology 3 FMU and is located in high priority area (IPL 8) with high IBGF Emission and Fire and moderate IBGF Absorption	Protection	Natural forest	16,908	20,483	37.391
		Plantation forest			
		Plantation	445	72	517
		Cultivation	586	107	693
		Built	77	67	143
		Non-productive	18,969	20,325	39.294
		Non-productive*			
		Others (water)	57		57
	Rehabilitation	Natural forest	8	11	19
		Plantation forest			-
		Plantation	74	1,706	1.781
		Cultivation	5,588	5,506	11.094
		Built	248	114	362
		Non-productive	11,122	10,727	21.848
		Non-productive*		263	263
		Others (water)	1,945	57	2.002
	Production	Natural forest			
		Plantation forest			
		Plantation	328		328
		Cultivation	435		435
		Built			
		Non-productive			
		Non-productive*	1,631		1.631
		Others (water)			
	Total (ha)		**58.419**	**59,438**	**117,857**

*Note: * rehabilitation areas in restored watershed and are critical landss*

4.2.5.2. Rotational Rehabilitation

The potential land area for rehabilitation activities with rotation in high priority areas (IPL 7-9) reaches 2.53 million ha, and most of them are in the provinces of East Kalimantan, Central Kalimantan, West Kalimantan and South Sumatra (**Table 71**). This means that the available land potential for RHL rotation is still sufficient to

achieve the NDC or LTS targets. Taking into account the criticality of the land and watershed conditions, the land area for RHL with rotation in the high priority index area is only 0.83 million hectares and is mainly spread in the provinces of East Kalimantan, West Kalimantan and South Sumatra (**Table 72**).

The main targets for rotational rehabilitation activities are areas which according to the IJLH are included in the production direction and are located on mineral lands. Those on peatlands are directed for restoration. The widest high priority areas are in non-HGU APL, PBPH HT and non-concession-HP, respectively 1.23 million ha, 0.57 million ha and 0.39 million ha (**Table 71**).

Of this area, the land that is included in the criteria for critical land and is in a watershed that needs to be restored, it reaches 0.30 million ha, 0.34 million hectares and 0.07 million hectares, respectively (**Table 72**). From the aspect of being responsible for the responsibility of the government, the rehabilitation for rotation in the APL area is the responsibility of the regional government. While in the concession area it is the responsibility of the holder of the responsibility for the responsibility and in non-concession forest areas by the central government (KLHK)).

Table 71. Land potential for rotational rehabilitation with high IPL (7-9)

Province	KPHP					Local Government		Total (ha)
	Non-Concession	PBPH-HT	PBPH-HA	PBPH-RE	PIAPS	Non HGU	HGU	
Bengkulu	-	-				36,927		36,927
Jambi	722	1,648		14,057	3,579	11,063	521	31,590
West Kalimantan	18,803	206,259	52		24,393	87,418	39,096	376,020
South Kalimantan	6,632	4,601			352	50,176	53	61,814
Central Kalimantan	296,674	54,868		1,654	2,819	281,765	37,957	675,738
East Kalimantan	55,577	27,110	60,602		9	576,029	141,262	860,589
North Kalimantan	-	-					102	102
Lampung	10	-				10,523		10,533
Riau	7,977	91,621	1,181		7,716	13,893	2,829	125,216
West Sumatra	602	-			0			602
South Sumatra	1,255	175,627		1		158,610		335,493
North Sumatra	4,248	8,304			1	3,696		16,248
Total (ha)	**392,500**	**570,038**	**61,834**	**15,711**	**38,869**	**1,230,100**	**221,820**	**2,530,872**

Table 72. Priority rotational rehabilitation on critical lands and restored watershed with high IPL (IPL 7-9)

Province	KPHP					Local Government		Total (ha)
	Non-Concession	PBPH-HT	PBPH-HA	PBPH-RE	PIAPS	Non HGU	HGU	
Bengkulu						10,801		10,801
Jambi	71	1,033		13,814	1,547	1,288	197	17,950
West Kalimantan	8,167	86,452			12,940	9,130	6,169	122,858
South Kalimantan	627	833			12	3,250		4,721
Central Kalimantan	19,855	12,780		705	506	15,963	1,974	51,783
East Kalimantan	37,670	11,584	30,495			203,043	55,133	337,924
Lampung						5		5
Riau	972	54,215			255	1,222	178	56,843
West Sumatra	602							602
South Sumatra	723	162,066		1		52,020		214.810
North Sumatra	2.434	7.368				1.497		11.299
Total (ha)	**71.122**	**336.330**	**30.495**	**14.520**	**15.259**	**298.220**	**63.652**	**829.596**

Based on the template, a more detailed analysis to see the target areas of rotational rehabilitation activities in several selected areas is presented in **Table 71** to **Table**

73. The target areas for the implementation of rotational rehabilitation activities in non-concession KPHPs reach 0.392 million hectares, which are located in 12 provinces and around 75% of this area is in Central Kalimantan Province (**Table 73**). Of this area, which falls into the critical category and is in the restored watershed, only about 18% or 0.07 million hectares (**Table 73**).

In Central Kalimantan Province, most of the non-productive land is in non-KPH production forest areas or in Convertible Production Forest (HPK) areas, which are included in the KPHP area as only 22.2% and the widest is in KPHP Unit VII which reaches 7,434 ha (**Table 73**). The condition of land cover in KPHP Unit VII Central Kalimantan Province based on IJLH is included in the production direction in **Table 74** The target area for rotational rehabilitation activities; a small part has been used by the community for cultivation activities.

Table 73. Priority areas (IPL 7-9) for rotational rehabilitation in the non-concession KPHPs of Central Kalimantan Province

KPH Unit	Typology	IPL	Plantation	Cultivation	Non-productive	Total (ha)
Unit VII-KPHP	2	7		771	6,663	7,434
Unit XIV-KPHP	1	7	2		7,032	7,034
Unit XIX-KPHP	1	7			370	370
Unit XV-KPHP	2	7		11	115	126
Unit XVIII-KPHP	3	7			455	455
Unit XX-KPHP	1	8	2		372	374
Unit XXII,Unit XXVI-KPHP	1	7	34	225	5,099	5,359
Unit XXIX-KPHP	1	7	36		3,597	3,633
Unit XXV-KPHP	1	8	82	3	2,068	2,152
Unit XXVII-KPHP	2	8	3		4,545	4,548
Unit XXVIII-KPHP	2	7	12	136	5,296	5,443
Unit XXXI-KPHP	1	8	814	0	4,832	5,646
Area Non KPHP (HPK)			3,307	12,306	238,489	254,102
Total (ha)			**4,291**	**13,452**	**278,932**	**327,288**

Table 74. Area distribution of KPHP Unit VII for rotational rehabilitation targets in Central Kalimantan Province by type of land cover

KPH Unit	Typology	IPL	Directional Use	PL 2019	Mineral (ha)
Unit VII-KPHP	2	7	Production	Natural Forest	2,550
				Plantation Forest	4,061
				Plantation	0
				Cultivation	771
				Non-productive	6,642
				*Non-productive	21
				Others (Water)	
				Total (ha)	**14,045**

*Note: * Rehabilitation areas included as a restored watershed and classified as critical land*

Furthermore, in non-productive land, the non-HGU APL area based on IJLH is included in the production directive and the most extensive is in East Kalimantan Province reaching 0.576 million ha or about 50% of the total non-productive land in

priority areas (IPL 7-9). The locations spread over eight districts and the widest is in West Kutai District, reaching 0.260 million ha (**Table 75**).

Of this, areas within the priority watershed and classified as critical, is only about 33% (**Table 75**). In APL-HGU, the location of the largest non-productive land is also in East Kalimantan Province with an area of 0.141 million ha spread over almost 60 HGUs. The HGU with the largest non-productive land is PT BN (**Table 77**). The target areas for rehabilitation are mostly not in priority watersheds and are classified as critical lands (**Table 78**). The use of this land can be directed for plantation expansion.

Table 75. Priority areas (IPL 7-9) for rorational rehabilitation implementation target in non-HGU APL by district/city in East Kalimantan Province

District/City	Priority APL	Non-productive	Total (ha)
Balikpapan City	9	893	893
Bontang City	7	259	259
Samarinda City	7	325	325
West Kutai	9	260,195	260,195
Kutai Kartanegara	9	178,095	178,095
East Kutai	8	93,257	93,257
Paser	8	37,616	37,616
North Penajampaser	7	5,389	5,389
Total (ha)		**576,029**	**576,029**

Table 76. Area distribution of rotational rehabilitation target areas in West Kutai District of East Kalimantan Province by type of land cover

District	IPL	Directional Use	PL 2019	Mineral	Total (ha)
West Kutai	9	Production	Natural Forest	100,074	100,074
			Plantation Forest		-
			Plantation	12,664	12,664
			Cultivation	2,609	2,609
			Built	797	797
			Non-productive	173,187	173,187
			Non-productive*	87,007	87,007
			Others (Water)	1,574	1,574
			Total (ha)	**377,912**	**377,912**

*Note: * Rehabilitation areas included as a restored watershed and classified as critical land*

Table 77. Area distribution of PT BN HGU according to IJLH utilisation directional use and land cover in East Kalimantan Province

Name of HGU	IPL	Directional Use	PL 2019	Total (ha)
PT BN	7	Production	Natural Forest	1,519
			Plantation Forest	2
			Cultivation	0
			Built	25
			Non-productive	11,662
			Non-productive*	33
			Others (Water)	
			Total (ha)	**13,241**

*Note: * Rehabilitation areas included as a restored watershed and classified as critical land*

Table 78. Total area for the implementation of rotational rehabilitation activities at APL-HGU priority locations (IPL 7-9) in East Kalimantan Province

Name of HGU	IPL	Total (ha)
DITJEN PERIKANAN 1	8	117
PT. ACK 1	7	259
PT. AIMM	8	2,591
PT. BSG	8	5,019
PT. B 2	7	469
PT. BN	8	11,696
PT. BPMB 2	7	232
PT. BAS	7	370
PT. BIM	8	2,035
PT. BJL 1	8	326
PT. BJL 2	7	30
PT. CIK	7	10,153
PT. CKM 2	8	1,006
PT. EKS 2	7	84
PT. HBP 1	7	2
PT. HBP 2	7	927
PT. HB	7	5,700
PT. IHE	8	6,096
PT. IAS	9	4,375
PT. JR	7	7,662
PT. JCL	7	3,791
PT. KAJ	8	69
PT. KBJ 1	7	30
PT. KBJ 4	7	1,035
PT. KI	7	1,645
PT. KPK	7	3,607
PT. LST Tbk 2	8	2,985
PT. MP	7	123
PT. MBU 1	7	30
PT. MBU 2	7	501
PT. MAL	8	3,691
PT. MJA	8	457
PT. NSJ	7	2,344
PT. PSLM	8	764
PT. PK 1	7	1,042
PT. PAK	7	53
PT. PKSM	8	6,973
PT. PMAM	9	7,488
PT. PU 1	9	5,745
PT. RKP 2	9	1,829
PT. SAU 4	8	1,361
PT. S 2	8	1,133
PT. S 3	9	89
PT. SBAP	8	1,989
PT. SKJ 1	7	12
PT. STNS	7	622
PT. TSS	7	4,676
PT. T	7	128
PT. TN	7	9,443
PT. TAB	8	5,240
PT. UI	7	77
PT. WBS 2	7	427
PT. WKK	7	279
PT. WN 2	8	7,220
PTPN XIII 1	8	4,151
PTPN XIII 3	7	965
PTPN XIII 7	8	21
PTPN XIII 9	7	81
Total (ha)		**141,262**

4.2.6. Peatland Management

Plantation forest areas in PBPH and plantations in HGU are potential area for peatland water management improvement actions with a toral area of 1.67 million ha (**Table 79**). This information shows that the potential area for peatland water management improvement actions is higher than the LTS-LCCP net sink target. In this case, there is a high chance of increasing emission reductions from water management improvement actions. Referring to the regulation of peatland water management (PerMenLHK No. 15/2017), the expansion of mitigation actions to improve water systems requires strict supervision by considering water level parameters into certification assessments (PHL and ISPO) and the basis for performance assessments for other policy innovations (e.g. incentives, sanctions, etc.).

Table 79. Potential mitigation action for water management improvement in PBPH and HGU

Province	HGU	PBPH-HT	Total (ha)
Aceh	31,558		31,558
Jambi	47,558	57,331	104,889
West Kalimantan	272,691	35,571	308,262
South Kalimantan	64		64
Central Kalimantan	51,386		51,386
East Kalimantan	7,952		7,952
North Kalimantan	31,620	13,289	44,909
Papua	1,062		1,062
Riau	432,620	294,164	726,784
West Sumatra	13,018		13,018
South Sumatra	24,735	316,490	341,225
North Sumatra	42,417	123	42,540
Total (ha)	**956,682**	**716,969**	**1,673,651**

Based on the distribution of the target provinces for the implementation of water system improvement activities, the largest area is in Riau province. In more detail, the names of concession and HGU holders in Riau province with potential areas for implementing water management improvement activities can be seen in **Table 80**. For PBPH HT, the largest area is in PT SRL, while the HGU is in the company PT BRN 2 (**Table 80**). To achieve the 2030 NDC and net sink targets, supervision of the implementation of the obligation to improve water management by concession holders in accordance with the Minister of Environment and Forestry Regulation No. P.15/2017 must be carried out strictly and become one of the important indicators in certification assessment.

In contrast to the mitigation actions to improve peat water management carried out in PBPH and HGU areas, peatland restoration activities are carried out in APL areas, concession areas, and all KPH areas, which have non-productive land cover, cultivation, and plantations. Peatland restoration actions in the LTS-LCCP scenario are almost twice as high as the NDC target, which is 2.45 million ha for the period 2021-2030. The potential area available for the implementation of restoration activities reaches 2.7 million hectares, of which around 40% is in medium priority areas (IPL 5-6) and 60% in high priority (**Table 81**). The potential of land available for restoration which is included in the medium-high priority (IPL 5-9) is greater than the net sink target of 2030.

Table 80. Total area of plantation forests and plantations to implement water management by company name in Riau Province

Name of PBPH-HT	Plantation Forest (ha)	Name of HGU	Oil Palm Plantation (ha)
PT. SRL	51,588	PT. BRN 2	77,891
PT. AA	43,232	PT. BRN 1	68,305
PT. SPA (Sk 244)	25,609	PT. GH M 2	29,097
PT. SPM	25,429	PT. GH M 1	22,179
PT. RA	24,363	PT. JJP	17,405
PT. RUJ	21,508	PT. GHM	16,419
PT. BBHA	21,502	PT. MM	12,147
PT. SG	15,594	PT. ACR 3	9,749
PT. SSL	9,096	PT. RSUP	9,198
PT. BDL	8,113	PT. RGMS	8,827
PT. MKS	7,682	PT. RAR	8,268
PT. SPA (Sk 19)	6,389	PT. RES	7,438
PT. RIA	4,841	PT. BPL	7,398
PT. RMP	4,424	PT. SJS	7,230
PT. BKM	4,183	PT. SDA 1	6,845
PT. MTNS	3,716	PT. TMP	6,483
PT. BDB	3,668	PT. P V (SG)	6,218
PT. BDB	3,602	PT. PSAS	5,865
PT. RML	3,501	PT. TKL	5,605
PT. MPL	2,250	PT. DU	5,415
PT. RRL	1,754	PT. MMJ 1	5,287
PT. SAU	1,287	PT. SS	4,748
Lainnya (6 HT)	686	PT. MSAL	4,546
		Lainnya (60 unit HGU)	80,056
Total	**294,015**	**Total**	**432,620**

Table 81. Potential peatland restoration areas in priority areas 5-6 and 7-9

Management Type	Area of Potential Peatland Restoration (ha)	
	Prioritas 5-6	Prioritas 7-9
Non-concession HP	**172,996**	**616,286**
KPHP- PBPH-HT	**100,527**	**382,847**
KPHP- PBPH-HA	10,748	66,837
KPHP- PBPH-RE	10,312	16,540
HL-Non PIAPS	**57,649**	**42,664**
CONSERVATION	207,734	108,950
KPHL-PIAPS	12,807	43,593
KPHP-PIAPS	63,865	200,624
PPKL-peat	87,829	354,387
HGU	59,046	128,483
Total (ha)	**783,514**	**1,961,212**

Based on the wide distribution, the location of peatland potential for restoration activities is largest in the production forest area outside the concession (**Table 81**) which reaches 0.84 million hectares (IPL 5-9) and most of it (73%) is in two provinces, namely Central Kalimantan. and Riau (**Table 82**). In more detail in Central Kalimantan Province, the largest area is in KPHP Unit XXXI with an area of 0.12 million hectares (**Table 83**). KPHP Unit XXXI is a KPHP whose entire area is peatland. About 9% of this area is still natural forest, and most of it is non-productive and cultivated land (**Table 83**). Areas that are non-productive or cultivated can

become targets for restoration and a cultivation system developed in the form of a farming system that is in accordance with the peat ecosystem.

Table 82. Potential peatland restoration areas of non-concession HP and HL (unlicenced) in priority areas 5-6 and 7-9

PROVINCE	Location Priority Index 5-6		Location Priority Index 7-9		Total (ha)
	HL	HP	HL	HP	
Bangka Belitung	-	3,866	-	-	3,866
Jambi	3,616	291	-	25,553	29,460
West Kalimantan	2,105	35,750	-	20,607	58,462
South Kalimantan	393	-	-	270	663
Central Kalimantan	38,737	1,569	42,664	345,413	428,383
East Kalimantan	-	-	-	763	763
Lampung	-	231	-	-	231
Papua	-	30,169	-	-	30,169
West Papua	-	17,693	-	-	17,693
Riau	-	26,061	-	175,325	201,386
South Sumatra	8,439	10,570	-	47,620	66,629
North Sumatra	4,358	1,460	-	736	6,554
Total (ha)	**57,649**	**127,660**	**42,664**	**616,286**	**844,259**

Table 83. Potential peatland restoration areas in non-concession KPHPs (unlicenced) in priority areas 7-9 of Central Kalimantan Province

Unit KPHP	Tiplogi	IPL	Hutan Alam	Hutan Tanaman	Perkebunan	Budidaya	Terbangun	Tidak Produktif	Lainnya	Total (ha)
Unit VII	2	7	610					64		674
Unit XIV	1	7	7,009		14	5	36	6,241	136	13,440
Unit XVIII	3	7	19,321		1	1,535	11	15,698		36,566
Unit XXII & XXVI	1	7	16,593		1,021	852	817	14,511	3,488	37,282
Unit XXIX	1	7	45,671		2	7,071		12,555		65,299
Unit XXV	1	8	553		36	230	12	31,217	806	32,855
Unit XXVII	2	8	2,110		5	1,202	279	4,268	169	8,032
Unit XXVIII	2	7	1,175		643	11,736	64	14,020	283	27,921
Unit XXXI	1	8	16,216		91	4,022		96,849	60	117,237
Non-KPH			45,911		3,047	35,377	2,220	83,100	2,465	172,122
Total (ha)			**155,170**	**-**	**4,859**	**62,031**	**3,438**	**278,523**	**7,407**	**511,428**

Table 84. Land cover status of KPHP Unit XXXI of Central Kalimantan Province

Name of KPHP	Typology	IPL	PL 2019	Mineral	Peatland	Total (ha)
Unit XXXI	1	8	Natural Forest		16,216	16,216
			Plantation Forest			
			Plantation		91	91
			Cultivation		4,022	4,022
			Built			
			Non-productive		96,849	96,849
			Others (Water)		60	60
Total (ha)					**117,237**	**117,237**

Table 85. Potential peatland restoration areas in high priority HI concessions (IPL 7-9) by province

Province	Plantation	Cultivation	Non-productive	Total (ha)
Jambi		984	216	1,200
West Kalimantan	4,367	3,904	27,433	35,704
Central Kalimantan	2,158	0	6,408	8,565
East Kalimantan	25	26	550	601
Riau	77,541	29,131	108,567	215,239
South Sumatra	11,172	4,156	106,209	121,537
Total (ha)	**95,264**	**38,200**	**249,383**	**382.847**

Furthermore, the target areas for peat restoration in PBPH-HT concession areas are those whose land use is plantations, cultivation of seasonal and non-productive crops,

which covers an area of 0.382 million hectares (**Table 85**). The largest area is in Riau province which reaches 56% of the total and its locations are spread over 26 concessions. The two PBPH-HT concessions with the largest restoration target areas are PT AA and PT SRL.

Table 86. Potential peatland restoration area in high priority PBPH-HT concessions (IPL 7-9) by company in Riau province

Name of PBPH-HT	Plantation	Cultivation	Non-productive	Total (ha)
CV ML	153		100	253
Kud BJL			78	78
PT. AA	2,597	2,485	23,467	28,549
PT. BKM	5,252	466	1,333	7,052
PT. BDL		32	3,212	3,244
PT. BBHA	94		6,622	6,716
PT. BRP	156	4	816	977
PT. MPL		723	569	1,291
PT. MKS	522	164	2,900	3,585
PT. MTNS	39	77	2,352	2,469
PT. NSR	4	6	147	157
PT. PB	1	2,004	3,744	5,749
PT. RA	1,812	3,283	11,044	16,138
PT. RIA	709	194	2,143	3,046
PT. RML	819	127	737	1,683
PT. RMP	67		946	1,013
PT. RRL	80	3,486	5,284	8,850
PT. RSU	3,672	1,896	73	5,641
PT. RUJ	9,885	3,589	2,487	15,960
PT. SPA (Sk 19)			294	294
PT. SPA (Sk 244)	892	317	9,656	10,864
PT. SPM	1,645	288	6,286	8,220
PT. SAU	81	51	821	953
PT. SSL	4,887	710	1,745	7,342
PT. SRL	35,605	2,583	19,157	57,345
PT. SG	8,569	6,647	2,554	17,770
Total	**77,541**	**29,131**	**108,567**	**215,239**

Note: The areas targeted for restoration are the areas for cultivation of seasonal crops, plantations and non-productive areas that are under the directional uses forf conversion, protection, production and rehabilitation.

Table 87. Potential peatland restoration areas of PT AA in Riau Province

Name	PL 2019	Mineral	Peatland	Total (ha)
PT AA	Natural Forest	7,129	7,000	14.129
	Plantation Forest	121,488	43,232	164.720
	Plantation	24,375	2,597	26.972
	Cultivation	21,524	2,485	24.009
	Built	303		303
	Non-productive	31,423	23,467	54.890
	Others (Water)	2,790	4	2.794
Total (ha)		**209.032**	**78,785**	**287,818**

Note: The restoration target area is the area for cultivation of seasonal crops, plantations and non-productive areas that are included in the directional uses for conversion, protection, production and rehabilitation.

PT AA has a total concession area of 0.287 million hectares, of which about 27% is on peatlands. In the peatland concession area, about 55% have developed forest plantations and about 36% are in the form of non-productive land, cultivation of annual crops and plantations which are the target areas for restoration (**Table 87**).

Supported by APBN/APBD funds, the implementation of peatland restoration on APL or community land area. Policies to support restoration efforts and wetland farming from government assistance to support peatland farming activities (paludiculture). Restoration activities by private concessions are carried out in accordance with the obligations in the 10-year General Work Plan (RKU) and the annual Technical Work Plan (RKT). This has so far been running in accordance with PP No. 57 Year 2016).

The successful implementation of restoration activities will determine success in reducing emissions from peat fires, which are the largest national source of greenhouse gas emissions. Emissions from peat fires increase significantly in years with long dry years which are often associated with El Nino weather events. Through peat restoration activities, the problem of peat subsidence can be overcome, especially during the long dry season so that the risk of fire can be reduced.

IBGF Fire contains information used in determining location priority (IPL). In terms of handling peat fires, the distribution of locations that need to be prioritised for the implementation of activities can use the more detailed information on IBGF Fire which consists of five categories, namely very high (5), high (4), moderate (3), low (2) and very low (1). In determining Location Priority Index (IPL), the IBGF Fire that describes the vulnerability of the site to fires is divided into three categories for simplification, namely high risk (having a high and very high level of vulnerability), medium (moderate level of vulnerability) and low (low and very low level of vulnerability).

Information on fire vulnerability can be integrated with information on fire-prone villages, which is compiled based on the frequency and intensity of fires that occur in a village and the type of land cover. Fire-prone areas are closely related to the presence of non-productive land. Villages that have large areas of non-productive lands, generally have a higher level of fire susceptibility.

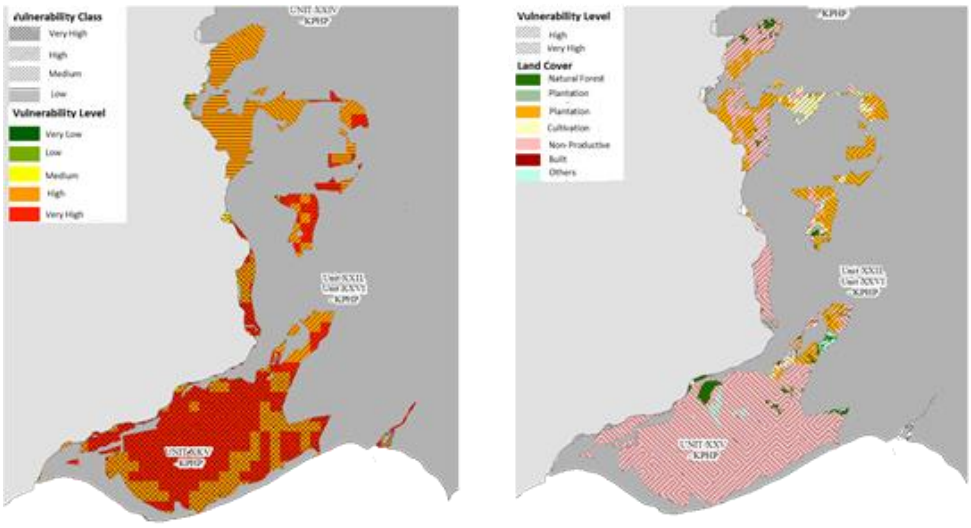


Figure 12. Distribution of vulnerability class and level of forest and land fires in UNIT XXV – KPHP (left) and distribution of land cover type (right)

Table 88. Fire risk areas by vulnerability class of the Directorate General of PPI and IBGF Fire in Central Kalimantan Province

FMU	Typology	IPL	Total Unit (Ha)	Village	Vulnerability class	IBGF Fire					IBGF=5 (%)	Priority village
					Forest and land fire	1	2	3	4	5		
UNIT IV-KPHL	1	7	7,801	Danau Tundai	Very High					1,176	15,08	1
UNIT IV-KPHL	1	7		Kalampangan	Very High					1,441	18,47	1
UNIT IV-KPHL	1	7		Kameloh Baru	Very High					2,239	28,71	1
UNIT IV-KPHL	1	7		Panarung	Very High					2	0,03	1
UNIT IV-KPHL	1	7		Sabaru	Very High					1,165	14,93	1
UNIT IV-KPHL	1	7		Tanjung Pinang	Very High					172	2,21	1
UNIT IV-KPHL	1	7		TanjungSanggalang	Very High					83	1,07	1
UNIT IV-KPHL	1	7		Tanjung Taruna	Very High					512	6,56	1
UNIT VIII-KPHP	4	5	73,395	Lemo I	Low			361	2,507			TP
UNIT VIII-KPHP	4	5		Lemo Ii	Low			2,694	19,459			TP
UNIT VIII-KPHP	4	5		Paring Lahung	Low			96	380			TP
UNIT VIII-KPHP	4	5		Pendreh	Low			3,161	28,442			TP
UNIT VIII-KPHP	4	5		Pepas	Low				1,116			TP
UNIT VIII-KPHP	4	5		Reong	Low			57	244			TP
UNIT VIII-KPHP	4	5		Rimba Sari	Low				1,658			TP
UNIT VIII-KPHP	4	5		Se Rahayu Ii	Low				77			TP
UNIT VIII-KPHP	4	5		Sei Rahayu I	Low				231			TP
UNIT VIII-KPHP	4	5		Tarusan	Low			1,452	4,28			TP
UNIT VIII-KPHP	4	5		Muara Jaan	Moderate				52			TP
UNIT VIII-KPHP	4	5		Beringin Raya	Moderate				410			TP
UNIT VIII-KPHP	4	5		Datai Nirui	Moderate				250			TP
UNIT VIII-KPHP	4	5		Barunang	Very High			482	2,005			TP
UNIT VIII-KPHP	4	5		Batapah	Very High			1,629	2,353			TP
UNIT XXV-KPHP	1	8	136,582	Air Dua	Low			49	1,023			TP
UNIT XXV-KPHP	1	8		Balai Riam	Low			32	4,245			TP
UNIT XXV-KPHP	1	8		Bangun Jaya	Low				81			TP
UNIT XXV-KPHP	1	8		Dawak	Low					516	0,38	2
UNIT XXV-KPHP	1	8		Ipuh Bangun Jaya	Low				32	31	0,02	3
UNIT XXV-KPHP	1	8		Jihing	Low			103	205			TP
UNIT XXV-KPHP	1	8		Mendawai	Low			22	52	23	0,02	3
UNIT XXV-KPHP	1	8		Natai Kondang	Low				279			TP
UNIT XXV-KPHP	1	8		Nibung Terjun	Low			12	5,041			TP
UNIT XXV-KPHP	1	8		Pelempangan	Low				1			TP
UNIT XXV-KPHP	1	8		Pempaning	Low			14	1,17			TP
UNIT XXV-KPHP	1	8		Riam Durian	Low				378	627	0,46	2
UNIT XXV-KPHP	1	8		Sembikuan	Low				785			TP
UNIT XXV-KPHP	1	8		Sukajaya	Low					408	0,30	2
UNIT XXV-KPHP	1	8		Sukamakmur	Low				42	2	0,00	3
UNIT XXV-KPHP	1	8		Sukamulya	Low				41	131	0,10	2
UNIT XXV-KPHP	1	8		Terusan	Low				0			TP
UNIT XXV-KPHP	1	8		Ajang	Moderate				978	5	0,00	3
UNIT XXV-KPHP	1	8		Pudu	Moderate				99	647	0,47	2
UNIT XXV-KPHP	1	8		Semantun	Moderate				6,268			TP
UNIT XXV-KPHP	1	8		Silat	Moderate				0			TP
UNIT XXV-KPHP	1	8		Suak Burung	Moderate				2			TP
UNIT XXV-KPHP	1	8		Karta Mulia	High				3,548	1,614	1,18	2
UNIT XXV-KPHP	1	8		Kenawan	High				154	100	0,07	3
UNIT XXV-KPHP	1	8		Laman Baru	High				22	0	0,00	3
UNIT XXV-KPHP	1	8		Palih Baru	High				7	17	0,01	3
UNIT XXV-KPHP	1	8		Pangkalan Muntai	High				1,176	1,798	1,31	2
UNIT XXV-KPHP	1	8		Sakabulin	High					7	0,00	3
UNIT XXV-KPHP	1	8		Sukaraja	High				1,284	1,58	1,15	2
UNIT XXV-KPHP	1	8		Sungai Baru	High				92	295	0,22	2
UNIT XXV-KPHP	1	8		Danau Buntar	Very High					0	0,00	2
UNIT XXV-KPHP	1	8		Guci	Very High					2	0,00	2
UNIT XXV-KPHP	1	8		Kuala Jelai	Very High					36	0,03	2
UNIT XXV-KPHP	1	8		Natai Sedawak	Very High			7	426	641	0,47	2
UNIT XXV-KPHP	1	8		Padang	Very High			224	3,056	3,897	2,85	1
UNIT XXV-KPHP	1	8		Petarikan	Very High			54	114	185	0,13	2
UNIT XXV-KPHP	1	8		Pulau Nibung	Very High			12	598	8,073	5,89	1
UNIT XXV-KPHP	1	8		Suka Ramai	Very High					2	0,00	2
UNIT XXV-KPHP	1	8		Sungai Bundung	Very High				2,433	323	0,24	
UNIT XXV-KPHP	1	8		Sg Cabang Barat	Very High				7,878	11,067	8,08	1
UNIT XXV-KPHP	1	8		Sungai Damar	Very High			36	2,522	20,294	14,82	1
UNIT XXV-KPHP	1	8		Sungai Pasir	Very High				3,641	4,363	3,19	1
UNIT XXV-KPHP	1	8		Sungai Raja	Very High				3,514	5,498	4,01	1
UNIT XXV-KPHP	1	8		Sungai Tabuk	Very High				6,945	15,898	11,61	1
TN Sebangau	3	6	594,226	Bakung Raya	Low				869	990	0,17	2
TN Sebangau	3	6		Kampung Baru	Low				4,387	1,833	0,31	2
TN Sebangau	3	6		Parupuk	Low				2,645			TP
TN Sebangau	3	6		Sebangau Jaya	Low				2,763			TP
TN Sebangau	3	6		Setia Mulia	Low				70	1,026	0,17	2
TN Sebangau	3	6		Sungai Kaki	Low				1,991	20	0	3
TN Sebangau	3	6		Tampelas	Low			103	5,207	383	0,06	3
TN Sebangau	3	6		Telaga	Low				1,748	110	0,02	3

FMU	Typology	IPL	Total Unit (Ha)	Village	Vulnerability class Forest and land fire	IBGF Fire 1	2	3	4	5	IBGF=5 (%)	Priority village
TN Sebangau	3	6		Banturung	Moderate				3,196			TP
TN Sebangau	3	6		Handiwung	Moderate				1,342	225	0,04	3
TN Sebangau	3	6		Petak Bahandang	Moderate				3,929	1,254	0,21	2
TN Sebangau	3	6		Asem Kumbang	High				18,709	3,005	0,51	2
TN Sebangau	3	6		Baun Bango	High				12,349	4,766	0,8	2
TN Sebangau	3	6		Jahanjang	High				7,925	212	0,04	3
TN Sebangau	3	6		Karuing	High				11,11			TP
TN Sebangau	3	6		Talingke	High				3,224	42	0,01	3
TN Sebangau	3	6		Tangkiling	High				3,61			TP
TN Sebangau	3	6		Tewang Tampang	High				354			TP
TN Sebangau	3	6		Bangun Jaya	Very High				4,853	685	0,12	2
TN Sebangau	3	6		Bukit Tunggal	Very High				8,639	2,883	0,49	1
TN Sebangau	3	6		Bumi Subur	Very High				1,013			TP
TN Sebangau	3	6		Galinggang	Very High			369	47	39	0,01	2
TN Sebangau	3	6		Habaring Hurung	Very High				1,892	2,871	0,48	1
TN Sebangau	3	6		Hiyang Bana	Very High				2,798	433	0,07	3
TN Sebangau	3	6		Kalawa	Very High				2	0	0	3
TN Sebangau	3	6		Kereng Bengkirai	Very High				13,317	8,609	1,45	2
TN Sebangau	3	6		Luwuk Kanan	Very High				168			TP
TN Sebangau	3	6		Mantaren I	Very High				32	17	0	3
TN Sebangau	3	6		Marang	Very High				1,26	2,195	0,37	2
TN Sebangau	3	6		Mekar Tani	Very High				10,792	9,725	1,64	2
TN Sebangau	3	6		Mendawai	Very High				126	2,181	0,37	2
TN Sebangau	3	6		Paduran Mulya	Very High				1,524	7	0	3
TN Sebangau	3	6		Paduran Sebangau	Very High			47	180,007	34,625	5,83	1
TN Sebangau	3	6		Perigi	Very High				39,294	11,823	1,99	1
TN Sebangau	3	6		Sabaru	Very High				2,567	8,078	1,36	2
TN Sebangau	3	6		Sebangau Mulya	Very High				2,229			TP
TN Sebangau	3	6		Sei Hambawang	Very High				363	125	0,02	3
TN Sebangau	3	6		Singam Raya	Very High				7,707	0	0	3
TN Sebangau	3	6		Subur Indah	Very High				333			TP
TN Sebangau	3	6		Teluk Sebulu	Very High					47	0,01	3
TN Sebangau	3	6		Tumbang Bulan	Very High			1,993	113,455	8,529	1,44	2
TN Sebangau	3	6		Tumbang Runen	Very High				6,356	774	0,13	3
Kota Palangkaraya (APL)	-	6	50,982	Bereng Malaka	Low			733	2,023			TP
Kota Palangkaraya (APL)	-	6		Bukit Sua	Low				1,762			TP
Kota Palangkaraya (APL)	-	6		Langkai	Low			268	256	343	0,67	2
Kota Palangkaraya (APL)	-	6		Mungku Baru	Low				1,317			TP
Kota Palangkaraya (APL)	-	6		Pahandut	Low			36	355	352	0,69	2
Kota Palangkaraya (APL)	-	6		Pahandut Seberang	Low			0	539	0	0	3
Kota Palangkaraya (APL)	-	6		Panjehang	Low				553			TP
Kota Palangkaraya (APL)	-	6		Petuk Barunai	Low				3,124			TP
Kota Palangkaraya (APL)	-	6		Tumbang Rungan	Low				838			TP
Kota Palangkaraya (APL)	-	6		Banturung	Moderate				1,142	44	0,09	3
Kota Palangkaraya (APL)	-	6		Bereng Bengkel	High				695	945	1,85	2
Kota Palangkaraya (APL)	-	6		Gaung Baru	High				388			TP
Kota Palangkaraya (APL)	-	6		Kanarakan	High				338	215	0,42	2
Kota Palangkaraya (APL)	-	6		Pager	High				994			TP
Kota Palangkaraya (APL)	-	6		Palangka	High			38	965	490	0,96	2
Kota Palangkaraya (APL)	-	6		Petuk Bukit	High				599	16	0,03	3
Kota Palangkaraya (APL)	-	6		Sei Gohong	High				1,54	162	0,32	2
Kota Palangkaraya (APL)	-	6		Takaras	High				2,133			TP
Kota Palangkaraya (APL)	-	6		Tangkiling	High				1,918	104	0,2	2
Kota Palangkaraya (APL)	-	6		Bukit Tunggal	Very High				1,753	1,037	2,03	1
Kota Palangkaraya (APL)	-	6		Danau Tundai	Very High				107	2,008	3,94	1
Kota Palangkaraya (APL)	-	6		Habaring Hurung	Very High				219	192	0,38	2
Kota Palangkaraya (APL)	-	6		Kalampangan	Very High					1,679	3,29	1
Kota Palangkaraya (APL)	-	6		Kameloh Baru	Very High				236	1,272	2,5	1
Kota Palangkaraya (APL)	-	6		Kereng Bengkirai	Very High				1,303	1,797	3,52	1
Kota Palangkaraya (APL)	-	6		Luwuk Kanan	Very High				0			TP
Kota Palangkaraya (APL)	-	6		Marang	Very High				56	427	0,84	2
Kota Palangkaraya (APL)	-	6		Menteng	Very High			99	127	1,415	2,78	1
Kota Palangkaraya (APL)	-	6		Panarung	Very High			43	605	1,658	3,25	1
Kota Palangkaraya (APL)	-	6		Petuk Katimpun	Very High				605	640	1,26	2
Kota Palangkaraya (APL)	-	6		Sabaru	Very High				1,35	372	0,73	2
Kota Palangkaraya (APL)	-	6		Tanjung Pinang	Very High				814	2,312	4,53	1
Kota Palangkaraya (APL)	-	6		Tanjung Sanggalang	Very High				314	35	0,07	3
Kota Palangkaraya (APL)	-	6		Tanjung Taruna	Very High				342	1,241	2,43	1
Kota Palangkaraya (APL)	-	6		Tewang Kadamba	Very High				43			TP
Kota Palangkaraya (APL)	-	6		Tumbang Tahai	Very High				1,011	640	1,26	2

Based on the IBGF Fires, the province with the largest high to very high fire-prone area is in Central Kalimantan Province which is spread over three KPH units, namely KPHL Unit IV, KPHP Unit XXV, Sebangau National Park and Palangkaraya City (**Table 88**). A more detailed analysis in KPHP Unit XXV shows that areas that have a high level of fire vulnerability reach 130,000 hectares and are generally located in areas with non-productive land cover conditions.

Table 89. Distribution of forest and land fire-prone villages and their vulnerability levels in KPHP Unit XXV of Central Kalimantan

PL 2019	Vulnerability	Village	Vulnerability level to forest and land fire					IBGF 5 (%)	Priority
			1	2	3	4	5		
Non-productive	Very High	Pulau Nibung, Suka Ramai, Sungai Bundung, Sungai Cabang Barat, Sungai Damar, Sungai Pasir, Sungai Raja, Sungai Tabuk			169	30,825	65,349	68,21	1
	High	Karta Mulia, Kenawan, Laman Baru, Pangkalan Muntai, Sukaraja, Sungai Baru				2,125	1,706	44,54	2
	Moderate	Ajang, Pudu, Semantun				4,207	231	5,21	2
	Low	Air Dua, Balai Riam, Bangun Jaya, Mendawai, Natai Kondang, Nibung Terjun, Pelempangan, Pempaning, Riam Durian, Sembikuan		156		6,469	3	0,05	3
Natural Forest	Very High	Natai Sedawak, Padang, Pulau Nibung, Sungai Cabang Barat, Sungai Damar, Sungai Pasir			53	454	2,095	80,53	1
	High	Karta Mulia, Sukaraja				651	269	29,26	2
	Moderate	Ajang, Pudu, Semantun				800	93	10,46	2
	Low	Balai Riam, Mendawai, Nibung Terjun			22	325	20	5,53	2
Cultivation	Very High	Natai Sedawak, Padang, Petarikan, Sungai Cabang Barat, Sungai Tabuk			7	209	852	79,77	1
	High	Karta Mulia, Kenawan, Laman Baru, Palih Baru, Pangkalan Muntai, Sukaraja				350	390	52,71	2
	Moderate	Ajang, Pudu, Semantun				1,094	29	2,55	2
	Low	Dawak, Ipuh Bangun Jaya, Jihing, Natai Kondang, Nibung Terjun, Pelempangan, Riam Durian, Sukajaya		1	1	41	259	85,67	2
Plantation	Very High	Guci, Natai Sedawak, Padang, Petarikan, Sungai Cabang Barat			104	75	529	74,74	1
	High	Karta Mulia, Kenawan, Laman Baru, Palih Baru, Pangkalan Muntai, Sakabulin, Sukaraja				2,637	2,592	49,58	2
	Moderate	Ajang, Pudu, Semantun, Silat, Suak Burung				1,242	299	19,38	2
	Low	Air Dua, Balai Riam, Bangun Jaya, Dawak, Ipuh Bangun Jaya, Jihing, Natai Kondang, Nibung Terjun, Pempaning, Riam Durian, Sembikuan, Sukajaya, Sukamakmur, Sukamulya, Terusan		35	208	6,536	1,455	17,67	2
Built	Very High	Natai Sedawak, Sungai Pasir				52	21	28,36	1
	High	Karta Mulia, Sukaraja				38	13	26,24	2
	Moderate	Ajang				3		-	TP
	Low	Nibung Terjun, Sembikuan				4		-	TP
Others	Very High	Padang, Pulau Nibung, Suka Ramai, Sungai Cabang Barat, Sungai Damar, Sungai Pasir, Sungai Tabuk			0	45	1,432	96,92	1
	High	Karta Mulia, Pangkalan Muntai				484	440	47,6	2
Total (ha)				**192**	**564**	**58,666**	**78,077**		

4.2.7. Biodiversity Conservation

Biodiversity conservation is part of the Sustainable Forest Management programme which includes; (1) Nature Conservation Patterning and Information, (2) Conservation Area Management, (3) Species and Genetic Conservation, and (4) Utilisation of Conservation Forest Environmental Services, and is also part of the environmental quality improvement programme through efforts to foster conservation outside state forest.

Within the framework of action to reduce greenhouse gas emissions from the forestry and land sector, biodiversity conservation can be viewed from various perspectives, starting from the conservation of wild plants and animals, habitat conservation and protection, to involving local communities and mainstreaming local wisdom.

Based on the analysis of environmental ecosystem services, many areas outside the conservation forest area have HCV and become pockets of wildlife habitat, so they need to be the target of implementing biodiversity conservation activities. Based on the risk analysis, the natural forested area outside the conservation area which is included in the protection directive with a medium to moderate IPL (IPL 5-6) reaches 6.9 million hectares and high to extreme high (IPL 7-9) reaches 2, 2 million hectares (**Table 90**). Areas in APL may be directed to become Grand Forest Park (Tahura).

Table 90. High conservation value natural forest outside conservation forests with IPL 5-9

Lokasi	IPL 5-6 (ha)	IPL 7-9 (ha)
HP-non Concession	1,781,782	593,936
PBPH-HT	653,441	341,066
PBPH-HA	2,437,631	7,775
PBPH RE	76,621	146,328
KPHP-PIAPS	286,159	177,759
KPHL-non PIAPS	1,115,357	68,726
KPHL-PIAPS	42,514	17,687
PEMDA-non HGU	407,981	442,460
PEMDA-HGU	140,414	121,724
Total (ha)	**6,941,899**	**2,227,079**

The area of natural forest that has HCV outside the conservation forest area is mostly located in non-concession production forest areas with a total area of 0.59 million hectares (**Table 91**) and most of them are in Central Kalimantan Province. The largest area that has high conservation in this provincial KPHP is in Unit XXXI (**Table 92**). In more detail, the condition of land cover in KPHP Unit XXXI is given in **Table 93**. It can be seen that in KPHP Unit XXXI, only 17% of the area is still natural forest and most of it is non-productive land that needs restoration priority.

Table 91. Natural forest area in unlicenced Protection Forest (non-concession HP) with high conservation value (protection directional use) located within IPL 5-9 area

Province	IPL 5-6 (ha)	IPL 7-9 (ha)
Bangka-belitung	11,359	
Bengkulu	41	
Jambi	193,735	20,457
West Java	118	
West Kalimantan	344,250	43,176
South Kalimantan	117,230	1,478
Central Kalimantan	828,729	326,518
East Kalimantan	1,712	21,705
Kepulauan Riau (Islands of Riau)	2,268	
Lampung	1,968	2,430
Maluku	2,620	
North Maluku	29	
East Nusa Tenggara	783	
Papua	98,209	
West Papua	64,583	
Riau	24,075	148,941
South Sulawesi	9,792	
Central Sulawesi	762	
Southeast Sulawesi	1	
West Sumatra	2,897	5,949
South Sumatra	32,648	23,196
North Sumatra	43,972	87
Total (ha)	**1,781,782**	**593,936**

Note: All locations according to IJLH are included in the protection directional use

Table 92. Total area of KPHP and non-KPHP units by type of land cover located at IPL 5-9 and 7-9 in West Kalimantan Province

KPHP Unit	Typology	IPL	Natural Forest	Plantation Forest	Plantation	Cultivation	Built	Non-productive	Others (Water)	Total (ha)
Unit VII	2	7	2,116	1	0	54		865		3,036
Unit XIV	1	7	7,801		13	0	1	6,064		13,878
Unit XIX	1	7	7,634		77	25		3,732		11,468
Unit XV	2	7	755		2	51		209		1,017
Unit XVIII	3	7	48,365		2	1		18,844		67,212

KPHP Unit	Typology	IPL	Natural Forest	Plantation Forest	Plantation	Cultivation	Built	Non-productive	Others (Water)	Total (ha)
Unit XX	1	8	47		1					48
Unit XXII & XXVI	1	7	21,661	3	147	1	15	13,013	271	35,113
Unit XXIX	1	7	47,404		6	95	2	8,593		56,100
Unit XXV	1	8	697		5	90		28,660		29,451
Unit XXVII	2	8	2,853		3	35		4,158	56	7,105
Unit XXVIII	2	7	4,402		335	819	66	10,700	81	16,403
Unit XXXI	1	8	23,552		66	7	252	106,003	1	129,881
Non-KPH			158,921	287	2,284	10,702	731	77,695	37	250,658
Total (ha)			**326,208**	**291**	**2,942**	**11,881**	**1,067**	**278,537**	**445**	**621,370**

Note: All locations according to IJLH are included in the protection directive

Table 93. Area of KPHP Unit XXXI by type of land cover in West Kalimantan Province

KPHP Unit	Typology	IPL	PL 2019	Mineral	Peatland	Total (ha)
XXXI	1	8	Natural Forest	7,336	16,216	23,552
			Plantation		66	66
			Cultivation		7	7
			Built	252		252
			Non-productive	15,896	90,107	106,003
			Others (Water)		1	1
			Total (ha)	**23,484**	**106,397**	**129,881**

4.3 Policy and Mitigation Action Towards Indonesia's FOLU Net Sink 2030

Policies and mitigation actions towards Indonesia's FOLU Net Sink 2030, is determine by taking into account the emission reduction targets to be achieved. Overview of the conditions determining policies oriented towards policies and mitigation actions to achieve the targets to be achieved in the NDC and Indonesia's FOLU Net sinks 2030, comprised fo the followings:

4.3.1. Prevention/Reduction of Forest Deforestation Rate

Forest protection from deforestation is one of the key actions for the success of the forestry sector and land towards net sink 2030. In the context of NDC and net sink, forest protection activities are carried out in locations with planned and unplanned deforestation potential. Planned deforestation is the conversion of natural forest that is carried out legally, including natural forested areas in HGU and PBPH-HT, which are included in the production direction which can be converted into plantations and plantation forests and also in APL and HPK which have the potential to be converted for non-forestry activities, even though they are carried out in a limited way. In the APL area, natural forest conversion occurs if in spatial planning, the natural forest area is included in the forestry and non-forestry cultivation zones. In areas with production directional use, the potential for planned deforestation activities can occur in the entire area, regardless of the IPL score of the area.

Unplanned deforestation is a change in natural forest cover into non-natural forest that has no legal basis, can be sourced from illegal forest encroachment on land without permits (inside and outside forest areas) with the direction of protection functions or PBPH and HGU lands with protection directional use, as well as from forest and land fires. The spatial analysis of operational planning uses IPL information to determine the area that has the potential to experience unplanned deforestation, namely areas with IPL 6-9. In this area, the driving factors for deforestation are quite high, so it can be identified as an area that has the potential to experience unplanned deforestation in the future. The consideration for choosing IPL

6-9 in identifying areas for unplanned deforestation is because in an effort to achieve Indonesia's FOLU Net Sink 2030, deforestation will no longer occur. All areas with moderate to high threat levels need attention.

Based on the NDC target and Indonesia's FOLU Net Sink 2030, the cumulative area of natural forest that can be converted from 2013 to 2024 and 2030 is 5.112 million ha and 7.268 million ha for NDC respectively, and 3.142 million ha and 4.225 million ha for Indonesia's FOLU Net Sink 2030. Based on spatial data, national deforestation in the 2013-2019 period has reached 4.803 million ha, which means that in the context of NDC, the remaining deforestation quota until 2030 is still around 2,465 million ha (**Table 94**). Efforts to achieve a more ambitious target, Indonesia's FOLU Net Sink 2030 are also carried out by pursuing targets according to LTS-LCCP, however, if this is not achieved, it is necessary to add more ambitious carbon stocks with rehabilitation at a lower IPL.

Table 94. Mitigation action targets for forest protection from NDC-CM1 and LTS-LCCP (Net Sink 2030) deforestation

Mitigation Action	Actual (x 1000 ha)	NDC Target (x 1000 ha)			Net Sink Target (x 1000 ha)		
	2013 -2019	2013 - 2024	2013 - 2030	Remaining quota	2013 - 2024	2013 - 2030	Remaining quota
Deforestasi on Mineral Land (x1000 Ha)	4,107	5,056	7,195	3,088	2,954	3,973	-134
Deforestasi on Peatland (x1000 Ha)	696	56	75	-621	188	253	-443
Total	**4,803**	**5,112**	**7,268**	**2,465**	**3,142**	**4,226**	**-577**

Under the LTS-LCCP scenario to reach NZE before 2060, deforestation quota until 2050 is only 1.7 million ha, or equivalent to an average deforestation of 57,000 ha per year (for the period 2021-2050). If the scenario that occurs follows the NDC scenario where deforestation still occurs according to its quota, then there will be no remaining quota after 2030. In other words, Indonesia should be able to achieve deforestation-free natural forests after 2030.

Several provinces with large natural forests and no land, productive areas are very limited like Papua Province, so a policy of tightening the use of natural forested land to meet development needs was established. The remaining quota of around 1.7 million hectares until 2050 is only given to eligible provinces. The policy basis for this implementation is PerMenLHK No.7/2021. This regulation stipulates that the release of forest areas for development purposes other than forestry activities is carried out in HPK areas by prioritising the criteria for non-productive land or non-productive forest with a dominance of more than 70% of non-forested land.

Control of planned deforestation in forest areas that have not yet been granted a permit can be carried out with further regulation of PBPH (Forest Management Business Permit). PBPH provides an opportunity to performed forestry multi-business activities in a permit area (MoEF Regulation Number 8 of 2021 concerning Forest Management and Preparation of Forest Management Plans, as well as Forest Utilisation in Protection Forests and Production Forests). The business permit granted to the manager must clearly regulate the use of areas that are still in natural forest and are only limited to NTFP activities and other environmental service businesses. Furthermore, in APL areas outside the concession, this can be done by incorporating Indonesia's FOLU Net Sink 2030 into the spatial planning process

through the KLHS policy in accordance with PP No.46/2016. In licenced areas (concessions), planned deforestation control can be carried out by developing incentive mechanisms, among the RBP REDD+ schemes that have been regulated in PerMen LHK No. 70/2017.

Controlling unplanned deforestation through economic empowerment and community development by involving all relevant parties, especially in areas with high emission risk levels (high IPL) must be increased. In its implementation, unplanned deforestation control activities require contributions from all area managers. Contributions from each area manager in the form of economic empowerment and community development activities are carried out in target areas that are determined in a coordinated manner, especially in areas with high deforestation risk. A strong institutional presence at the site level is needed to facilitate the implementation of various programmes and activities in a synergistic and coordinated manner. The process of determining the target area for the implementation of planned and unplanned deforestation control programmes and activities based on the template can be seen in **Figure 13.**

Analysis of the template indicate that for the period 2021-2030, potential area to experience deforestation reaches 10.47 million hectares. Planned and unplanned deforestation each reached a total area of 5.32 million ha (0.53 million ha per year) and 5.15 million ha (0.52 million ha per year) distributed over various forest functions and APL (**Table 95**). The largest area with a high potential to experience planned deforestation is projected to be in Papua Province (1.36 million ha), while the largest unplanned deforestation area is in Central Kalimantan Province (1.69 million ha). More detailed analysis by area stakeholder is described in the following subchapters.

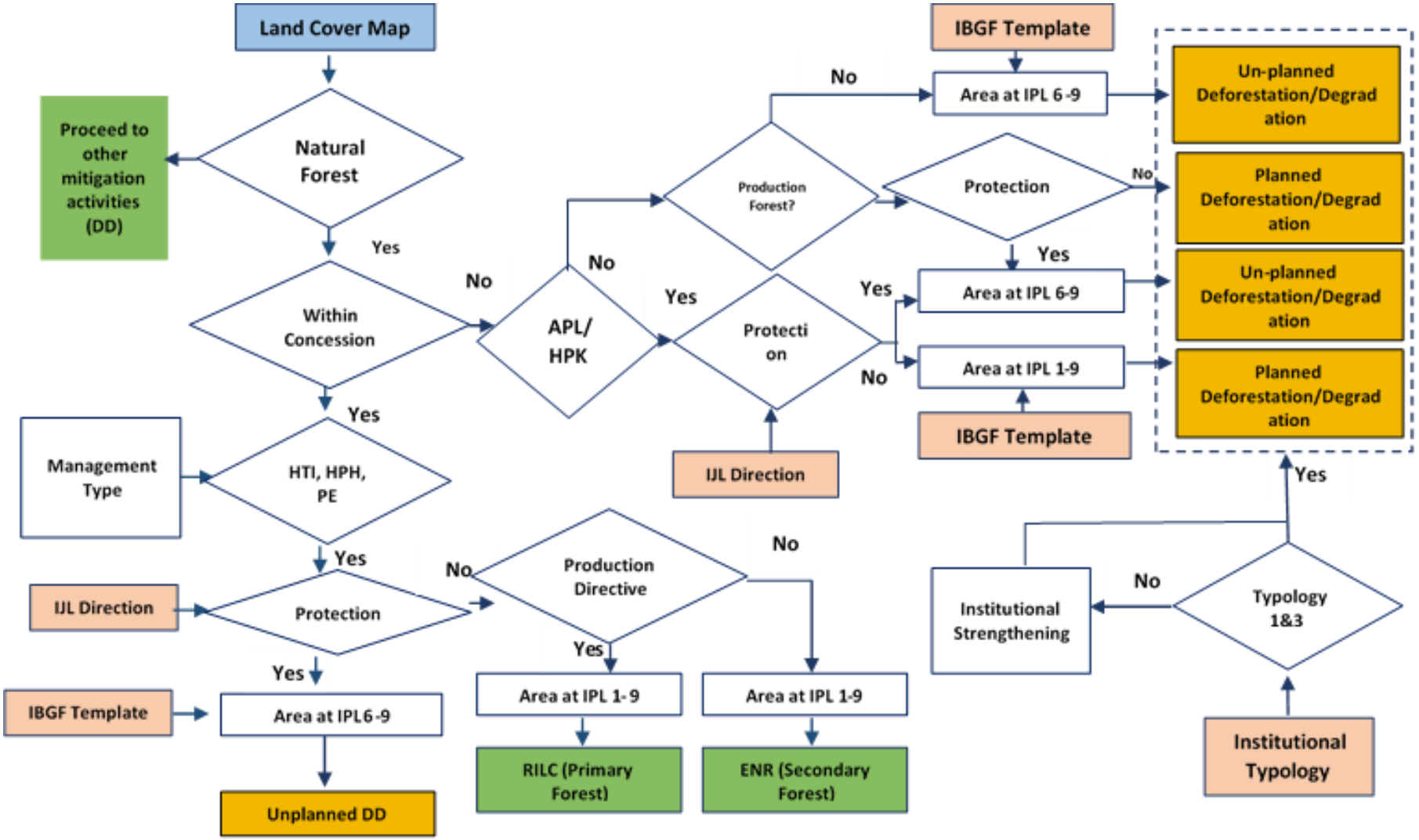


Figure 13. The process of using templates in determining locations with threats of planned and unplanned deforestation

Note: green box indicates mitigation actions outside the control of the associated deforestation

Table 95 Total area of mitigation actions for the prevention/reduction of deforestation rate by province and area managers

Province	PHL		KSDAE[1]	PDASRH/PHL[2]	PSKL	PEMDA		TOTAL (ha)	
	Planned Def	*Unplanned Def*	*Unplanned Def*	*Unplanned Def*	*Unplanned Def*	*Planned Def*	*Unplanned Def*	*Planned Def*	*Unplanned Def*
Aceh	12,060	-	-	61	-	72,100	37,220	84,160	37,281
Bali	-	-	-	-	-	1,513	4	1,513	4
Bangka-belitung	41,443	1,156	-	14,912	895	17,649	2,393	59,093	19,357
Banten	-	-	-	-	-	398	-	398	-
Bengkulu	-	-	-	40,237	8,780	3,576	2,296	3,576	51,313
Gorontalo	30,516	-	-	-	-	7,475	-	37,991	-
Jambi	14,285	170,568	99,955	-	13,544	10,890	41,380	25,175	325,446
West Java	-	-	-	-	-	4,098	-	4,098	-
Central Java	-	-	-	1,507	-	3,592	-	3,592	1,507
East Java	-	-	4,154	-	-	13,908	-	13,908	4,154
West Kalimantan	98,786	393,742	4,375	16,804	55,550	104,813	243,762	203,600	714,237
South Kalimantan	85,476	217,286	34,044	-	18,081	26,493	16,130	111,969	285,542
Central Kalimantan	188,080	705,925	569,921	156,812	142,206	14,323	121,456	202,403	1,696,320
East Kalimantan	182,361	223,897	15,643	6,234	16,794	265,367	308,960	447,728	571,528
North Kalimantan	63,516	32,471	-	-	14	405,296	3,572	468,812	36,057
Kepulauan Riau (Riau Islands)	-	-	1,114	-	-	33,895	3,385	33,895	4,499
Lampung	84	2,468	389	727	-	7,036	2,894	7,120	6,477
Maluku	103,708	-	-	-	-	118,104	811	221,812	811
North Maluku	23,590	-	-	-	-	88,432	-	112,022	-
West Nusa Tenggara	26,120	-	-	-	3,002	79,923	353	106,043	3,355
East Nusa Tenggara	24,761	3,094	348	6,267	3,820	541,894	138	566,654	13,668
Papua	417,833	-	-	96,914	24,516	939,875	1,036	1,357,708	122,466
West Papua	52,006	60,672	-	-	-	382,306	-	434,312	60,672
Riau	25,110	540,744	161,978	33,410	97,011	6,547	40,360	31,657	873,503
West Sulawesi	2,402	-	-	-	-	13,298	5,061	15,700	5,061
South Sulawesi	5,460	-	-	-	-	18,079	12,993	23,539	12,993
Central Sulawesi	94,102	-	-	-	-	270,859	32	364,961	32
Southeast Sulawesi	30,943	-	-	-	-	62,349	-	93,291	-
North Sulawesi	1,998	-	-	-	-	35,658	687	37,656	687
West Sumatra	27,242	2,891	-	368	609	78,620	25,838	105,863	29,705
South Sumatra	11,804	117,203	23,853	84,441	5,673	36,998	7,956	48,802	239,124
North Sumatra	25,583	10,433	-	14,730	5,543	64,249	7,428	89,832	38,133
Total (ha)	**1,589,269**	**2,482,549**	**915,775**	**473,424**	**396,038**	**3,729,613**	**886,145**	**5,318,883**	**5,153,931**

Note:1 Comprising conservation forest area, [1] Covering the HL-non PIAPS area, currently the stated area is under the authority of DG of PHL

4.3.1.1. Directorate Generale of Sustainable Forest Management (PHL)

The Directorate Generale of Sustainable Forest Management (DG of PHPL) has a mandate in carrying out the formulation and implementation of policies in production forests, including the areas of *Perizinan Berusaha Pemanfaatan Hutan* (PBPH) for HT (PBPH-HT), HPH (PBPH-HA), and RE (PBPH-RE). Referring to **Table 96**, the DG of PHL has contributes 4.07 million ha of forest protection until 2030, of which 1.59 million ha of forest protection from planned deforestation and 2.48 million ha of forest protection from unplanned deforestation.

Production Forest Area that is still natural forest currently reaches 40.7 million ha. Although the highest natural forest areas are in the provinces of Papua (10.2 million ha), East Kalimantan Province (4.7 million ha), and West Papua province (4.7 million ha; see **Table 16**), based on risk information, natural forest areas in production forests with high-extreme high risk (IPL 7-9) are in the provinces of Riau (0.63 million ha) and Central Kalimantan (0.47 million ha; see **Table 17).** Furthermore, within the concession area almost half of natural forest is at high risk from the threat of unplanned deforestation, is in the PBPH-HA area (0.61 million ha), and furthermore in PBPH-HT (0.60 million ha), and PBPH RE (0.33 million ha). Meanwhile, 0.94 million ha are in non-concession production forest areas.

To reduce the level of unplanned deforestation, through PerMen LHK No. 9/2021, PBPH business licence owners is directed and facilitated to partner with the community, especially on land that has the potential to have conflict with the process of resolving profit-sharing arrangements based on the status of the existence of assets/capital. Although the Social Forestry scheme does not cover direct forest protection activities, but it is important to understand, that deforestation is inseparable from the social and economic problems of communities in forest areas. In this case, improving community welfare through partnerships, especially agroforestry activities with PBPH, can reduce pressure on natural forests for agricultural land extensification and dependence on natural forests as sources of illegal timber.

Socioeconomic problems of forest communities and deforestation activities have become part of the attention of the DG of PHL through the Sustainable Forest Management and forestry business programmes in the form of fostering communities around forests to increase farm productivity (**Table 97**). In addition, the DG of PHL is also responsible for increasing the number of effective KPHs, or KPHs that play an active role in facilitating the community in the process of utilising forest areas and products, as well as empowering forest village communities that are included in the KPH management area. Improvement of KPH institutions will play an important role in deforestation protection activities, especially in non-licenced or non-PBPH areas, particularly in the provinces of Central Kalimantan, West Kalimantan, and Riau (**Table 96**). In this area, it is necessary to increase the capacity of FMUs, especially FMUs with weak institutions that have high social capital (A2, B2, C2, and D2; see **Table 10**). The template map of the results of the spatial analysis of operational planning in this case can help adjust the DG of PHL programme to accelerate the provision of access to social forestry in areas that have the potential to experience unplanned deforestation.

Table 96. Total area of mitigation actions for the protection of forests from deforestation by the Directorate General of PHL

Province	Non-concession HP	PBPH-HA	PBPH-HT		PBPH-RE	HPK	TOTAL (ha)	
	Unplanned Deforestation	*Unplanned Deforestation*	*Planned Deforestation*	*Unplanned Deforestation*	*Unplanned Deforestation*	*Planned Deforestation*	*Planned Deforestation*	*Unplanned Deforestation*
Aceh	-	-	12,060	-	-	-	12,060	-
Bangka-belitung	1,156	-	41,443	-	-	-	41,443	1,156
Gorontalo	-	-	30,516	-	-	-	30,516	-
Jambi	54,877	5,438	14,285	65,741	44,512	-	14,285	170,568
West Kalimantan	206,102	1,288	93,053	176,659	9,693	5,734	98,786	393,742
South Kalimantan	95,435	108,369	80,874	13,482	-	4,602	85,476	217,286
Central Kalimantan	286,670	259,852	15,142	63,200	96,202	172,938	188,080	705,925
East Kalimantan	25,034	133,697	180,603	65,166	-	1,758	182,361	223,897
North Kalimantan	-	32,471	63,516	-	-	-	63,516	32,471
Lampung	2,468	-	84	-	-	-	84	2,468
Maluku	-	-	103,708	-	-	-	103,708	-
North Maluku	-	-	23,590	-	-	-	23,590	-
West Nusa Tenggara	-	-	26,120	-	-	-	26,120	-
East Nusa Tenggara	3,094	-	24,761	-	-	-	24,761	3,094
Papua	-	-	417,833	-	-	-	417,833	-
West Papua	60,672	-	52,006	-	-	-	52,006	60,672
Riau	138,772	72,209	6,447	194,394	135,369	18,663	25,110	540,744
West Sulawesi	-	-	2,402	-	-	-	2,402	-
South Sulawesi	-	-	5,460	-	-	-	5,460	-
Central Sulawesi	-	-	94,102	-	-	-	94,102	-
Southeast Sulawesi	-	-	30,943	-	-	-	30,943	-
North Sulawesi	-	-	1,998	-	-	-	1,998	-
West Sumatra	2,890	-	21,395	1	-	5,848	27,242	2,891
South Sumatra	54,581	-	11,800	22,085	40,536	4	11,804	117,203
North Sumatra	10,433	-	20,126	-	-	5,457	25,583	10,433
Total (ha)	**942,184**	**613,324**	**1,374,267**	**600,729**	**326,313**	**215,003**	**1,589,269**	**2,482,549**

The forestry multi-business policy (SK PerDirJen PHL No.1/2020) is expected to reduce the level of planned deforestation in concessions. In PBPH-HT areas, areas with natural forest can apply the TPTI or other SILIN systems to avoid clear cut or non-timber business. Referring to PerMenLHK No.8/2021, natural forest protection blocks in production forests can be directed into the form of NTFPs and environmental services, while utilisation blocks can be directed to Selective Cutting and Line Planting (TPTJ) and Social Forestry (PS) management in the form of forestry partnership.

Utilisation of natural forests in concession areas with other types of direction other than protection functions can be directed in the form of utilising carbon services through the REDD+ scheme. In the context of providing incentives from forest protection activities, information from the template map can be used in determining the distribution of (*Result Based Payment*-RBP based on the level of risk (IPL) in the REDD+ performance area. In this case, the template map can be used as a basis for determining RBP payments and translated into REDD+ policies. Referring to **Table 17, Table 18** and **Table 19**, the area of natural forest in the PBPH area that has the potential to receive payments from REDD+ (production function) reaches 1.54 million ha.

Control of unplanned deforestation in Production Forest areas, especially Convertible Production Forests (HPK) also needs to be prioritised. According to the DG of PHL, the area of production forest that is not managed by KPH (i.e. area in HPK, but currently in the process of being revised to be included in the KPH management area) is quite large and fall into the high-extreme high risk area (IPL 7-9) reaches 0.2 million ha. Based on the IPL analysis, of the 4 million hectares natural forest area , approximately 0.21 million hectares are in areas with a high to extreme

high IPL (IPL 7-9; **Table 26**) and about 0.39 million hectares in moderate to moderate high IPL (IPL 5-6; **Table 27**). Areas with IPL 7-9, have a fairly high threat of deforestation and most (83%) are in Central Kalimantan Province, while areas with IPL 5-6 have a moderate to moderate high level of deforestation threat and most are located in two provinces (70 %) namely Papua and West Papua. Currently, the non-KPH area (with HPK status) is being revised to be included in the KPH management area (**Table 26**) and is higher in the moderate to moderate-high risk (IPL 5-6), which is 0.4 million ha (see **Table 27**). In this case, the expansion of the KPH area to non-KPH areas is needed to ensure that natural forest cover is not in an open access status without supervision. In addition, the implementation of Resort Based Management KPH, an extension of the KPH down to the site level, can be a solution to protect unplanned deforestation sources, especially from fires.

The risk of deforestation on unsupervised land can also occur in areas within the Indicative Map for Moratorium the Granting of New Permits (PIPPIB) (INPRES 5/2019). Primary forest and peatland conservation without adequate supervision can inadvertently leave natural forests in open access conditions. The Decree of the Minister of Environment and Forestry No. 5446/2021 concerning the determination of the 2nd Period PIPPIB map in 2021 is the current PIPPIB Decree. This decree will continue to be updated every 6 months. To avoid open access conditions in the PIPPIB area, it is possible that the PIPPIB area can be managed in the form of utilising NTFPs and environmental services.

With the increasing presence of managers in high-risk production forest areas, it is hoped that it will reduce the level of unplanned deforestation. Coordination for this policy synchronisation can be done with the Directorate General of PKTL. Coordination with the Directorate General of PKTL that needs to be optimised also includes strengthening the spatial database for licensing matters (forest use). Incomplete or low quality spatial data for forest use (where data custodian is the DG of PHL), will make it difficult to know whether it is legal (planned) and illegal (unplanned) deforestation in forest use areas.

Based on the RPJMN KLHK 2020-2024 programme and activities, there are four programmes under the DG of PHL related to the prevention of deforestation and forest degradation as shown in **Table 97**. The selection of the location for the implementation of programmes and activities needs to pay attention to the results of the template analysis so that the impact of programmes/activities on emission reduction can be achieved. justified and measured.

Table 97. Programmes and activities of the Directorate General of PHL related to forest protection from deforestation

No	Programme	Kegiatan
1	Improved Production Forest Management Planning	Number of effective FMU organization
2	Forestry Industry Business Improvement	Development of timber-based forestry industry
		Development of non-timber-based forestry primary industry
		Market development and improvement of timber forest products supply chain
3	Enhancing Environmental Services Business for Production Forest and NTFPs	NTFP Production
4	Sustainable Forest Management and Forestry Business Programme	Timber forest product production (natural forest, plantation forest (including energy forest), community forest, HTR, etc.)
		Development of Non-productive Village Forest Management (HD), Community Plantation Forest (HTR) and Community Forest (HKm)
		Development of Extensive Utilisation of NTFPs in Protection Forests
		Implementation of Production Forest Ecosystem Restoration
		Timber Legality Verification System (SVLK)
		Fostering communities around the forest to increase farm productivity

Referring to **Table 96** regarding the implementation of forest protection activities towards net sinks, the working area that are used to be under the responsibility of the DG of PDASRH, currently is under the authority of DG of PHL, have contributed 0.47 million ha of unplanned forest protection implementation by 2030. Currently, approximately 16.6 million ha of protected forest area, are still natural forest and only 10% of forested areas within social forestry concessions (**Table 28**). The high-extreme high risk area (IPL 7-9) is 0.08 million ha and more than half of it is in Central Kalimantan (**Table 29**). The area of moderate to high risk (IPL 5-6) is 1.2 million ha with the highest area in West Kalimantan and South Sumatra (**Table 30**).

In non-PIAPS natural forest areas, it is necessary to strengthen the institution of KPH, especially in KPHs with land cover that has already been used by the community or has the potential for conflict. In this area, cooperation with the DG of PSKL is needed for the expansion of Social Forestry areas. In this case, the DG of PSKL has an important role in the expansion of Social Forestry in Protected Forest areas considering the high number of natural forested areas without KPH (0.5 million ha). Improving the socioeconomic conditions of communities in protected forest areas will indirectly have an impact on reducing deforestation, especially in high-extreme high-risk areas.

The synergy between Forest and Land Rehabilitation (RHL) activities and Social Forestry (PS) is supported by PerMenLHK No. 105/2018, where the proposal for RHL activities can be made by the PS chairman. By referring to PerMenLHK No.2/2020 concerning the implementation and incentives of RHL and PerMenLHK No.9/2021, which concerns Social Forestry, from an implementation perspective, the financing of both RHL and PS activities can be harmonised. In addition, the synchronisation will also ensure the supply of seeds for the PS programme, both from the People's Nursery (KBR) and permanent nurseries or centres of nurseries. Synchronisation of RHL and PS activities can be used as a new standard in determining effective FMUs.

4.3.1.2. Directorate General of Conservation onNatural Resources and Ecosystem (KSDAE)

The Directorate General of Conservation on Natural Resources and Ecosystem (KSDAE) has a mandate to formulate and implement policies for the conservation of natural resources and ecosystems. Referring to **Table 96** regarding the implementation of forest protection activities towards net sinks, the Directorate General of KSDAE has contributed to the implementation of forest protection from unplanned deforestation sources of 0.92 million ha until 2030. Currently, the natural forest area in conservation forest areas reaches 16.5 million ha (**Table 35**). In this area, 0.3 million ha are in high-extreme high priority (IPL 7-9) (**Table 36**) and 1.8 million ha are in medium-slightly high priority (IPL 5-6), with the highest area being in Central Kalimantan (**Table 36**).

In conservation areas, natural forest protection is related to the protection of wildlife corridors, especially from unplanned deforestation or forest encroachment. In the context of existing land in conservation forest areas, the settlement mechanism is based on Government Regulation Number 23 of 2021 and Government Regulation Number 24 of 2021, one of which is through Social Forestry with a conservation partnership scheme (PerMenLHK No.9/2021). Referring to the Decree of the

Directorate gGeneral of KSDAE No.6/2018 the conservation partnership process can be in the form of community empowerment programmes or cooperation agreements (in traditional blocks) with an emphasis on conflict resolution and partnerships for the use of NTFPs, or conservation in ecosystem restoration (rehabilitation zones) with the main objective of restoring function of ecosystem gradually. In its implementation, conservation partnerships can be harmonised with RHL activities and social forestry, but must still be adapted to the conservation context, for example the location of animal corridors.

part of the Directorate General of KSDAE programme (**Table 98**). The operational planning spatial template in this case can provide institutional typology information at the site level (based on institutional capacity) to determine conflict resolution options. Adjustment of the direction for location programme to high risk levels of unplanned deforestation and institutional typology can directly determine the support needed from the Directorate General of Law Enforcement on Environment and Forestry programmes for protected area management.

Table 98. Programmes and activities of the Directorate General of KSDAE related to forest protection from deforestation

No	Programme	Activity
1	Fostering the Conservation of Essential Ecosystems	Improving the Effectiveness of Essential Ecosystem Management
		Development of Protected Area
		Essential Ecosystems and Protection Forests Protecting Conservation Areas, Essential Ecosystems and Protection Forests; Conservation FMU Area (KPHK)
2	Protected Area Management	Community empowerment protected areas
		Problem management of protected areas (opened areas)
		Development of National Parks and Natural Tourism Parks as support for priority tourist destinations
		Development of High Conservation Value Areas (HCVF) and Genetic Resource Areas
		Utilisation of NTFP in Essential Ecosystem Area (KEE)
		Buffer zone management
		Protection of wildlife habitat from deforestation
		Protection of areas with high plant biodiversity

In addition, to increase state revenue from non-tax revenues and improve the welfare of communities around conservation forest areas, expansion of nature tourism permits (Environmental Services Business Licences) can be an alternative, but only in utilisation zones (PP No. 5/2021 concerning Implementation of Risk-Based Business Licensing).

Although functionally the Directorate General of KSDAE has authority over conservation forest areas, at the site level, essential ecosystems including landscape corridors, may intersect with non-conserved areas. Protecting HCV (BKT) areas, especially those that are still in natural forest, requires collaboration with area stakeholders (PBPH licence holders, HGU owners, local governments, etc.), for example, through spatial adjustments (in APL) or determination of BKT areas as protected areas (in production forest areas) in accordance with PerMenLHK No.8/2021. Elaboration of the policy on BKT land will be explained in section 4.3.7. on Biodiversity Conservation.

4.3.1.3. Directorate General of Social Forestry and Environmental Partnership (PSKL)

The Directorate General of Social Forestry and Environmental Partnership (DG of PSKL) has a mandate to formulate and implement policies to increase community roles in forest management, customary forest management, and environmental partnerships. Referring to **Table 95** regarding the implementation of forest protection activities towards net sinks, the Directorate General of PSKL will have contributed 0.40 million ha of forest protection implementation from unplanned deforestation sources until 2030.

The area of natural forest with a high level of risk of experiencing unplanned deforestation in PS licences in production forest areas reaches 0.32 million ha, while in protected forest areas it reaches 71,000 ha (**Table 99**).

Protection of natural forests in the PIAPS permit area can be done by increasing the provision of access to forest area management by communities in unmanaged production forest areas and strengthening social forestry business development (**Table 96**), especially in provinces with high potential areas for unplanned deforestation. namely the provinces of Central Kalimantan and Riau (in the KPHP area) and the provinces of Central Kalimantan and West Kalimantan (in the KPHL area).

The acceleration of providing access to PS in indicative areas (PIAPS) has become part of the PSKL programme, namely through coaching clinics and FGD activities with outputs in the form of PS proposals. However, for areas that are not included as an indication of PS (PIAPS) it requires the role of the FMU to facilitate the application process. To increase the role of the FMU in the expansion of the PS area, facilitation of PS application can be included as one of the performance indicators of the FMU.

Table 99. Total area of mitigation actions for the protection of forests from deforestation by the type of management of the Directorate General of PSKL

Province	KPHL-PIAPS	KPHP-PIAPS	Total
	Unplanned Def	*Unplanned Def*	*unplanned def (ha)*
Aceh	-	-	-
Bali	-	-	-
Bangka-belitung	32	862	895
Banten	-	-	-
Bengkulu	7,898	882	8,780
Special Region of Yogyakarta	-	-	-
DKI Jakarta	-	-	-
Gorontalo	-	-	-
Jambi	-	13,544	13,544
West Java	-	-	-
Central Java	-	-	-
East Java	-	-	-
West Kalimantan	8,334	47,216	55,550
South Kalimantan	7,384	10,697	18,081
Central Kalimantan	13,061	129,145	142,206
East Kalimantan	239	16,555	16,794
North Kalimantan	-	14	14
Kepulauan Riau (Riau Islands)	-	-	-
Lampung	-	-	-

Province	KPHL-PIAPS	KPHP-PIAPS	Total
	Unplanned Def	*Unplanned Def*	*unplanned def (ha)*
Maluku	-	-	-
North Maluku	-	-	-
West Nusa Tenggara	325	2,678	3,002
East Nusa Tenggara	3,820	-	3,820
Papua	24,516	-	24,516
West Papua	-	-	-
Riau	898	96,113	97,011
West Sulawesi	-	-	-
South Sulawesi	-	-	-
Central Sulawesi	-	-	-
Southeast Sulawesi	-	-	-
North Sulawesi	-	-	-
West Sumatra	29	580	609
South Sumatra	218	5,455	5,673
North Sumatra	4,974	569	5,543
Total (ha)	**71,728**	**324,310**	**396,038**

Table 100. Programmes and activities of the Directorate General of PSKL related to forest protection from deforestation

No	Programme	Kegiatan
1	Social Forestry and Customary Forest Business Development	Product value added industry
		Investment/in business partnership
		Marketing/Promotion of social forestry products
		Capacity Building (Managed Areas, Institutions, and Businesses) of Community Groups
		Fostering communities around the forest to increase farm productivity
2	Preparation of Social Forestry Area	Providing access to forest area management by the community

In addition to accelerating the expansion of PS, the guidance for PS that has been formed also plays an important role in improving the welfare of forest communities. In this case, PS has an institutional classification called the Social Forestry Business Group (KUPS) with different levels of institutional capacity in the strata category (blue, silver, gold, and platinum), which will determine the pattern of coaching and facilitation. The current Social Forestry programme is included in the PEN programme and receives funding support from the APBN which is intended for activities to provide access and business development facilities, including the preparation of management plans. The spatial template information for operational planning in this case can be used in the process of developing the Social Forestry Work Plan (RKPS), especially in determining the type of business/utilisation (timber, NTFPs, etc.).

In addition to social forestry, DG of PSKL also plays a role in the development of customary forests. Currently, it is known that there are 120 communities indicated as customary forests, and an area of 2.5 million ha of potential customary forest in the APL area. The return of customary areas to forest areas is also a concern of the Directorate General of PSKL with the aim of ensuring that the use of customary forests is under forestry regulations and not under regional authority. However, the process of returning customary forests to state forest areas must be accompanied by the recognition of community identity with legal recognition from the local government, so the recognition process can take a long time. To speed up the process of establishing customary forests, new policy instruments are needed that can simplify the administrative process to customary forests.

With this situation, since 2019 policies and steps have been taken to get closer to the formation of Customary Forests. The existence of customary forests was formally recognised in the forestry mapping system (legend of forest maps), namely in December 2016 with the official state recognition by the President of the Republic of Indonesia regarding customary forests. This condition is able to help accelerate the support for area management by the Customary Law Community through Social Forestry, namely in the form of Village Forests. Village Forests can be managed by Indigenous Peoples, while continuing to process the legitimacy of Indigenous Peoples Groups in accordance with Law Number 41 of 1999 and Permendagri Number 52 of 2014.

The existence of customary forests is very important, among others, with the aim and function of preserving ecosystems (forests and the environment), ensuring the living space of Customary Law Communities, protecting local wisdom, traditional knowledge and resolving conflicts related to communities in and around the area. Based on data from the Directorate General of PSKL as of January 2022, 89 customary forest units have been established with an area of 75,802 hectares. Meanwhile, the indicative area of the Customary Forest is 1,091,109 Ha, if there is a stipulation regarding the Indigenous Peoples Unit. The determination of the Indicative Customary Forest Area (WILHA) or the candidate for Customary Forest to become a Customary Forest, according to the law, can be done if there is already a stipulation regarding the Customary Forest Community Unit in the area of the candidate for customary forest which is stipulated by a Regional Regulation or Regent's Decree.

It is not easy to stipulate Regional Regulations (Perda) of Indigenous Peoples Units by the Regions (Local Government and DPRD) and therefore it is necessary to facilitate facilitation by the government for the completion of Perda. Facilitation can be done with the parties, the Provincial Government, Regency/City, relevant Ministries such as KLHK and also the Ministry of Home Affairs, in accordance with the mandate of Law Number 11 of 2020.

Based on the lessons learned from the implementation of the verification of Customary Forests, there are several important things that need to be considered in involving Customary Forests in Indonesia's FOLU Net Sink 2030 scheme, namely:

1. Limited Human Resources Assistant.

   One of the factors that contributed to the low number of proposals for Customary Forests was the limited capacity of social activists or supporting NGOs. The conceptions of private good, public goods, common-pool resources, and land tenure in the context of customary territories, property, customary lands, customary forests, plus the conception of indigenous peoples are fundamental things that need to be mastered by those who work as activists and facilitators of indigenous peoples. and customary forests.

2. Motivation for Proposing Customary Forests.

   In some indigenous communities, the motive for proposing Customary Forests is more driven by economic interests (access to land) than the motive for protecting forest ecosystems and protecting customary orders. Seeing this, the process of acknowledging Customary Forests which takes place in a relatively short time in a large area, has the potential to pose a risk of failure of the sustainability of Customary Forests in the long term.

3. Understanding of Climate Change Issues.

   Considering that indigenous communities are generally traditional communities that do not know much about and master modern management, greenhouse gases, the economic value of carbon, the biggest challenges that will be faced when involving HA in Indonesia's FOLU Net Sink 2030 include the following; (1) strong and consistent strategies and affirmative steps are needed to increase the capacity of adat community administrators and members in such a way that Indigenous Peoples are able to manage the carbon economic value of Customary Forests, (2) considering that tenure problems are often encountered in every adat community and region. Therefore, including Customary Forests in Indonesia's FOLU Net Sink 2030 scheme must be accompanied by an important note that agrarian/tenure issues must be addressed simultaneously, and (3) it is necessary to have policies and concrete countermeasures to protect indigenous communities from external actors. who wish to access Customary Areas and Customary Forests for the purpose of carbon economic value without increasing the capacity of indigenous peoples and without considering the fairness of distribution with indigenous peoples.

4.3.1.4.Local Government

In APL areas, the protection of natural forests from deforestation has an important role because of their convertible status according to local authorities. Referring to **Table 95** regarding the implementation of forest protection activities towards net sinks, the Local Government has contributed 3.7 million ha of forest protection from planned deforestation and 0.88 million ha from unplanned deforestation. Of the total 3.73 million ha of planned deforestation protection, 3.29 million ha are in non-HGU areas and most of them are in the provinces of Papua, East Nusa Tenggara, and West Papua, while 0.44 million ha are in HGU areas and most are in the provinces of Papua and North Kalimantan (**Table 101**). For controlling unplanned deforestation, most of the area is also in non-HGU areas (0.68 million ha), especially in the provinces of East Kalimantan and West Kalimantan. The area for implementing forest protection from unplanned deforestation within the HGU area is only 0.20 million ha, most of which is in the province of West Kalimantan.

Referring to the results of the spatial analysis of the operational planning template, forest protection areas, both from unplanned and planned sources, are mostly located in non-HGU areas, which indicates the importance of the role of Local Governments in protecting natural forests outside forest areas. In APL areas, control of deforestation can be carried out by DG PPKL through several programmes such as ecosystem replication, afforestation and Green Space (RTH).

For natural forest areas that are indicated as BKT areas, it can be directed to be proposed as Tahura, where the socialisation process can be carried out through regular meetings between the Directorate General of KSDAE and the Regional Government, as well as receiving payments from the REDD+ RBP by registering with the SRN system or with sub-national institutions for regions that have developed a REDD+ system. In addition to incentives from REDD+, forest protection activities at the local government level can receive incentives from the ecology-based budget transfer scheme (TAPE/TAKE).

Table 101. Total area of mitigation actions for the protection of forests from deforestation by the type of management of the Local Government (PEMDA)

Province	PEMDA-HGU		PEMDA Non-HGU		TOTAL (ha)	
	Planned Deforestation	*Unplanned Deforestation.*	*Planned Deforestation*	*Unplanned Deforestation*	*Planned Deforestation*	*Unplanned Deforestation*
Aceh	5,396	306	66,704	36,914	72,100	37,220
Bali			1,513	4	1,513	4
Bangka-belitung			17,649	2,393	17,649	2,393
Banten			398		398	-
Bengkulu	277		3,300	2,296	3,576	2,296
Gorontalo			7,475		7,475	-
Jambi	377	156	10,513	41,225	10,890	41,380
West Java			4,098		4,098	-
Central Java			3,592		3,592	-
East Java			13,908		13,908	-
West Kalimantan	50,909	121,335	53,904	122,427	104,813	243,762
South Kalimantan	2,466	1,854	24,027	14,276	26,493	16,130
Central Kalimantan	3,212	23,574	11,110	97,882	14,323	121,456
East Kalimantan	84,770	34,823	180,597	274,137	265,367	308,960
North Kalimantan	120,601	3,572	284,695		405,296	3,572
Kepulauan Riau (Riau Islands)	2,713	97	31,182	3,288	33,895	3,385
Lampung	24		7,012	2,894	7,036	2,894
Maluku			118,104	811	118,104	811
North Maluku			88,432		88,432	-
West Nusa Tenggara			79,923	353	79,923	353
East Nusa Tenggara			541,894	138	541,894	138
Papua	148,264		791,611	1,036	939,875	1,036
West Papua	7,290		375,016		382,306	-
Riau	1,066	17,217	5,481	23,143	6,547	40,360
West Sulawesi	143		13,155	5,061	13,298	5,061
South Sulawesi	11		18,068	12,993	18,079	12,993
Central Sulawesi	9,571	32	261,288		270,859	32
Southeast Sulawesi	554		61,795		62,349	-
North Sulawesi	254		35,404	687	35,658	687
West Sumatra	1,108		77,512	25,838	78,620	25,838
South Sumatra			36,998	7,956	36,998	7,956
North Sumatra	654	59	63,595	7,369	64,249	7,428
Total (ha)	**439,660**	**203,025**	**3,289,953**	**683,120**	**3,729,613**	**886,145**

In the TAPE/TAKE scheme, the number of incentives received by local governments is determined based on the formulation of the allocation of funds by adding ecological indicators, such as the area of green open space as carried out by the Province of North Kalimantan, or the area of forest cover as carried out by the Province of Papua. In addition to area managers who are directly responsible for natural forest protection actions, the achievement of forest protection activities from deforestation requires supporting activities, including from the Directorate General of Environmental and Forestry Law Enforcement, the Directorate General of Climate Change (PPI), Extension and Human Resources Development Agency, and the Directorate General of Forestry Planning and Environmental Governance (PKTL) (**Table 102**).

Table 102. Programmes and supporting activities related to the protection of forests from deforestation

No	Directorate General/ Agency	Programme	Activity
1	Law Enforcement on Environmental and Forestry	Forest Prevention and Protection	Forest area security operations
			Illegal forest products circulation operation
			Patrol activities, outreach and field operations to protect forests from threats and disturbances
			Enforcement of criminal law to prevent forest fires, illegal mining/logging, and forest encroachment

No	Directorate General/ Agency	Programme	Activity
			Awareness on forest protection (illegal logging & encroachment/shifting cultivation)
2	Climate Change	Forest and Land Fire Control	Forest and land fire management
			Forest and land fire prevention
			Fire extinguishing operation to reduce area of forest area
			Implementation of zero burning in land preparation
			Fostering shifting cultivators to shift to permanent agricultural activities
			Awareness of forest and land fires
			Facilitating the implementation of climate change mitigation
			Study and research on forest and land fire control activities
3	Extension and Human Resources Development	Improvement of Extension Services	Establishment of Independent Forest Farmers Group (KTH) for community productive business development
			Forest Farmer Group assistance
			Capacity building for reliable extension workers and/or facilitators for community groups
		Implementation of LHK Apparatus and Non Apparatus Training	Capacity building for MoEF human resources at site level
			Implementation of industrial and entrepreneurial oriented vocational training for technical personnel in the field of environment and forestry
		Implementation of Community Training and Environmental Generation Development	Establishment and development of Community Forestry Business Apprenticeship Training Institutions/LP2UKS for the community
			Capacity building and community awareness in environmental management
			Increasing the number& capacity of resources for avoided deforestation
		Implementation of Forestry Vocational Secondary Education	Implementation of vocational education based on SKKNI
			Available forestry vocational intermediate technical personnel
4	Forestry Planning and Environmental Management	Establishment and Administration of Forest Areas	Determination/consolidation of forest areas, especially in protected areas
			Activities for determination and expansion of forested areas into state forest areas
			Forest area boundary arrangement and maintenance
			Forest zone planning and determination
			Restoration of ex-mining land (afforestation and reforestation)
5	Environmental Pollution and degradation Control		Providing guidance for stakeholders involved in damaged ex-mining land recovery

The supporting activities needed to control planned and unplanned deforestation are not the same. Natural forest conversion, especially in APL and HPK areas, can occur for non-forestry activities. In this case, the spatial template of operational planning, especially information on directions for optimising forest areas, can be used as a basis for submitting area function swaps, so that utilisation for development and non-forestry activities can be prioritised in areas with conversion directions and not on protection directional use.

In areas with potential for unplanned deforestation, forest protection programmes from the DG of Law Enforcement on Environment and Forestry are needed, which can be directed at high risk areas by utilising information on institutional typology and IPL scores. Improving the welfare of the community in this area is also needed by increasing the assistance activities of farmer groups from the Extension and Human Resources Development. Agency.

On the other hand, the completion of boundary demarcation also needs to be carried out as part of the forest area determination programme by the Directorate General of PKTL. To protect forests from the threat of fire, the DG of PPI plays a role in carrying out forest and land fire control programmes (**Table 102**).

4.3.2. Concession Forest Degradation

Saving primary forest from degradation due to logging or timber harvesting activities in concession areas is one of the GHG emission reduction activities. In Indonesia's Long-Term Strategy towards net sinks (LTS-LCCP), prevention of primary forest degradation into secondary forest in concession areas is one of the important contributions of the private sector in the PBPH licensing area to achieve the net sink target. The upper limit of cumulative primary forest degradation in the net sink scenario (LTS-LCCP) for the period 2013-2024 is 1.70 million ha and for the period 2013-2030 around 2.28 million hectares (**Table 103**).

Table 103. Targets for the implementation of degradation prevention activities for NDC-CM1 and LTS-LCCP

Mitigation Action	Actual (x 1000 ha)	NDC Target (x 1000 ha)			Net Sink Target (x 1000 ha)		
	2013 - 2019	2013 -2024	2013 -2030	Remaining quota	2013 -2024	2013 -2030	Remaining quota
Natural forest degradation quota in concession	441[1]	N. A[2]	N. A[2]	N. A[2]	1,705	2,283	1,841

Note: [1]Sourced from KLHK land cover data, [2] In the NDC document, the degradation value represents the total national value, not specific on the concession

The rate of natural forest degradation in concession areas during the 2013-2019 period is known to be 0.44 million ha, so that the remaining quota for forest degradation until 2030 for the net sink target is only 1.8 million ha (0.18 million ha per year). To achieve the net sink target, the rate of forest degradation should no longer follow the historical rate. In other words, forest protection from degradation in concession areas should be kept as low as possible through forest protection. In addition, the primary forest area that has been degraded as secondary forest should be restored as soon as possible through artificial regeneration to increase the uptake of secondary forest.

Based on the source, forest degradation is also divided into planned and unplanned degradation. Planned degradation is a planned change of primary natural forest cover to legally secondary, for example areas with production directions within the PBPH-HT and PBPH-HA licensing areas. Unplanned degradation can occur in areas with protected directions within the entire PBPH permit area. The spatial analysis of operational planning uses IPL information to determine the area that has the potential to experience unplanned degradation, namely the protection directive with IPL 6-9. In this area there are strong driving factors and indications of high rates of forest conversion in the past.

The spatial analysis of operational planning to obtain the implementation area of forest prevention from planned and unplanned degradation can be seen in **Figure 14**. The results of the analysis show that in the PBPH-HA area there are 4.57 million ha of primary natural forest that has a threat of planned degradation and 0.12 million ha unplanned degradation until 2030. Forest protection activities from degradation in the PBPH area are under the authority of the Directorate General of PHL. However, by adhering to the same principles as forest protection from deforestation which requires synergistic actions, contributions from other area managers (including the DG of PKTL, DG of PPI, DG of PSKL, and others) are also needed in the form of supporting activities.

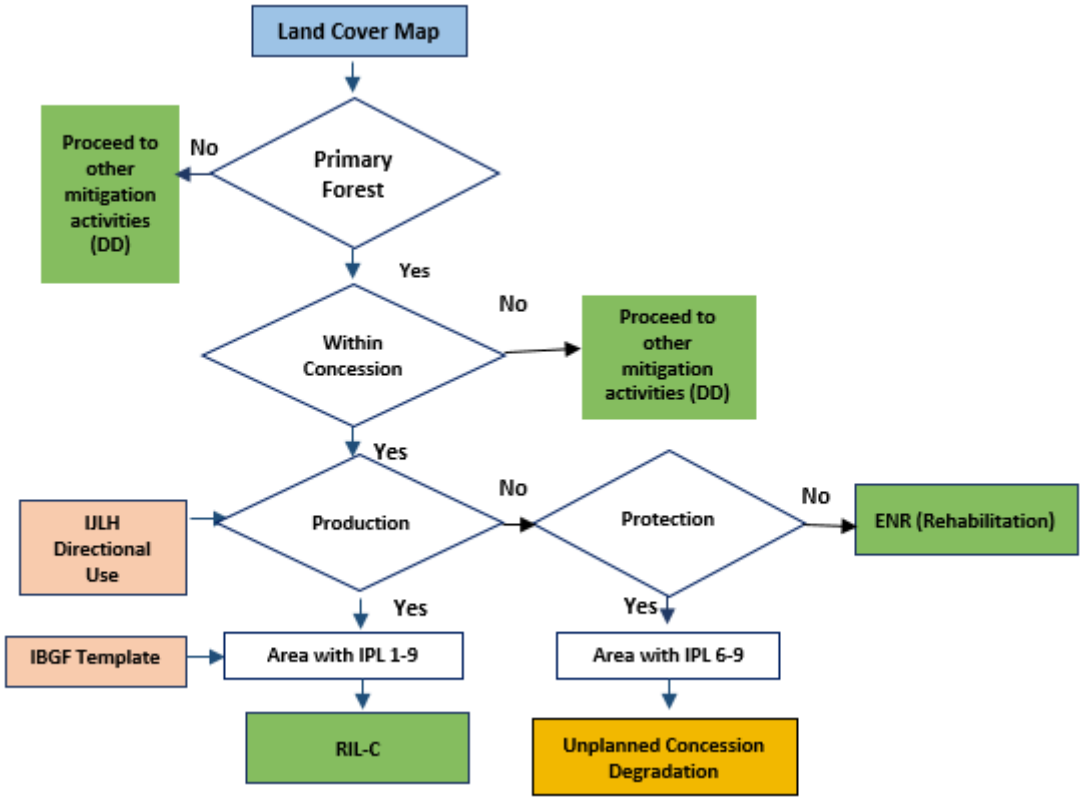


Figure 14. The process of using templates in determining locations with planned and unplanned degradation threats

Note: green box indicates mitigation actions outside the degradation control

Table 104. Total area of mitigation actions from degradation for protection of forests within concession area

Province	PBPH-HT		PBPH-RE	PBPH-HA		TOTAL (ha)	
	Planned_ Degradation	Unplanned_ Degradation	Unplanned_ Degradation	Planned_ Degradation	Unplanned_ Degradation	Planned_ Degradation	Unplanned_ Degradation
Aceh	165	-	-	1,062	-	1,227	-
Bangka-belitung	428	-	-	-	-	428	-
Bengkulu	-	-		7	-	7	-
Gorontalo	425	-	-	-	-	425	-
Jambi	951	23,185	-	-	-	951	23,185
West Kalimantan	8,334	7,980	-	24,984	-	33,317	7,980
South Kalimantan	-	37	-	410	247	410	283
Central Kalimantan	6	4	-	67,783	12,911	67,789	12,915
East Kalimantan	1,462	4,382	-	349,812	4,236	351,274	8,618
North Kalimantan	115	-	-	985,674	-	985,788	-
Maluku	25,968	-	-	45,712	-	71,680	-
North Maluku	9	-	-	75,040	-	75,049	-
West Nusa Tenggara	1,781	-	-	2,557	-	4,338	-
East Nusa Tenggara	10,904	-		-	-	10,904	-
Papua	70,985	-	-	1,447,471	-	1,518,456	-
West Papua	61	-	-	1,305,512	-	1,305,573	-
Riau	-	4,276	3,007	-	-	-	7,283
West Sulawesi	10	-	-	4,778	-	4,788	-
Central Sulawesi	54,295	-	-	59,035	-	113,330	-
Southeast Sulawesi	16,427	-	-	-	-	16,427	-
North Sulawesi	159	-	-	7,882	-	8,041	-
West Sumatra	0	1	-	2,170	-	2,171	1
South Sumatra	190	1,116	-	-	-	190	1,116
North Sumatra	227	-	-	1,107	-	1,334	-
Total (ha)	**192,903**	**40,980**	**3,007**	**4,380,996**	**17,394**	**4,573,899**	**61,381**

4.3.2.1. Directorate General of Sustainable Forest Management (PHL)

Currently, there is 4.89 million ha of primary forest located within the PBPH-HA area (see **Table 46**). Referring to the table for implementing actions to protect forests from degradation (**Table 104**), an area of 4.38 million ha has the potential to experience planned degradation, most of which are in the provinces of Papua and West Papua. In addition, an area of 17,000 ha of primary forest in PBPH-HA also has the potential to experience unplanned degradation, most of which are in Central Kalimantan. Within the PBPH-HT area, there is 0.30 million ha of primary forest (see **Table 46**).

Referring to the table for implementing actions to protect forests from degradation (**Table 105**), an area of 0.20 million ha of primary forest in the PBPH-HT area has the potential to experience planned degradation and most of it is located in the provinces of Papua and Central Sulawesi. In addition, an area of 40,000 ha of primary forest in PBPH-HT also has the potential to experience unplanned degradation, most of which are in Jambi Province. In the PBPH-RE area with the type of utilisation of environmental services, there is only the potential for unplanned degradation with a total area of 58,000 ha and more than 90% are in East Nusa Tenggara Province.

The DG of PHL programmes related to primary forest protection efforts include the prohibition of primary forest logging which is included in the protection directive (**Table 105**). The DG of PHL can take advantage of the spatial operational planning template in adjusting the direction for optimising forest areas with the directions that have been included in the RKU and AMDAL documents (in areas that have obtained PBPH permits).

Table 105. Programmes and activities of the Directorate General of PHL related to forest protection from degradation

No	Programme	Activity
1	Enhancing Environmental Services Business for Production Forest and NTFPs	NTFP Production
2	PHL certification development	Implemention of policy concerning primary forest logging prohibition under the protection directional use based on the IJLH
3	Development of incentive system for the prevention of primary forest degradation	Implementing a policy of prohibiting primary forests clearance under the production directional use based on IJLH

To ensure the regulation of primary forest protection runs, PBPH needs to be assisted by KPH in the conflict resolution process to minimise forest encroachment within the PBPH area. Through the social forestry scheme, areas that have already been used by the community, both inside and outside the PBPH area, can be directed into a form of forestry partnership with a profit sharing system based on the ratio of the existence of assets from the community.

In addition, through the forestry multi-business scheme, business activities in natural forest areas can still be carried out for the type of utilisation of NTFPs and environmental services. In the case of business activities based on environmental services, the protection of natural forests within the concession area (in the production direction function) can be part of the REDD+ scheme (PerMenLHK No. 70/2017). Primary forest protection activities within the PBPH area (in the direction of production) can also receive incentives through the REDD+ scheme. There are

4.57 million ha of primary forest in PBPH-HA and PBPH-HT that have the potential to receive RBP financing. The spatial template map in this case can be used in the process of determining the RBP REDD+ based on the level of risk faced by each PBPH permit owner.

Currently, KLHK is developing the National Registry System (SRN) to become an integrated system with other systems that have been built by the Directorate General of KLHK and other K/L, both for data collection, as well as for distribution of funding for payments based on results of RBP REDD+ activities, where the private sector who wish to enter into the REDD+ scheme must register their PBPH area into the SRN. However, private participation is still very limited, so to increase participation it is necessary to disseminate information on the payment mechanism based on environmental services (RBP).

In addition to the Directorate General of PHL, programmes from other area managers can indirectly support forest protection from degradation, especially in primary forests outside the PBPH area. Area managers that can be involved include supports from the DG of Law Enforcement on Environmental and Forestry, DG of Climate Change (PPI) to safeguard and protect forests from encroachment and fires, Extension and Human Resources Development Agency, DG of PSKL to improve the welfare of the surrounding community. forest area through a forestry partnership scheme and DG of PKTL regarding the settlement of forest area boundaries (**Table 102**).

4.3.3. Plantation Forest Development

Plantation forest expansion is an important action aimed at meeting the demand for industrial timber (domestic and international) and reducing dependence on wood production from natural forests. The NDC and LTS-LCCP scenarios have the same target for the cumulative area of plantation forest development in 2030, which is 11.227 million ha. Until 2019, it is known that the area of PBPH-HT in Indonesia has reached 5.12 million ha (**Table 106**).

Table 106. Mitigation targets for the development of plantation forests for NDC-CM1 and LTS-LCCP

Mitigation Action	Actual (x 1000 ha)	NDC Target (x 1000 ha)			Net Sink Target (x 1000 ha)		
	2019	2011 - 2024	2011 - 2030	Sisa kuota[2]	2011 - 2024	2030	Sisa kuota
Plantation Forest development	5,117[1]	9,307	11,227	6,110	9,307	11,227	6,110

Note: [1]Based on satellite data, the area of HT in APL is 0.816 million ha, while in forest area it is 4.303 million ha (HT is 2.479 million ha, and non-HT is 1.824 million ha). Referring to the Asosiasi Pengusaha Hutan Indonesia (APHI) roadmap document, the planted forest area in the PBPH-HT concession in 2019 is 3,140 million ha and in 2020 it has reached 3,500 million ha; [2]The remaining quota is the value of the difference between the target area and the realised area.

Of the 5.12 million ha of plantation forest cover detected from spatial data, only 2.48 million ha came from PBPH-HT, while 1.82 million ha was outside the PBPH-HT area, including the Perhutani indicative, PIAPS indicative, and community plantation forests (**Figure 15**). Meanwhile, an area of 0.82 million ha is in the APL area and is an indicative community forest. To meet the 2030 FOLU Net Sink target, an additional 6.1 million ha of plantation forest development is required until 2030 or 0.6 million ha per year (**Table 106**).

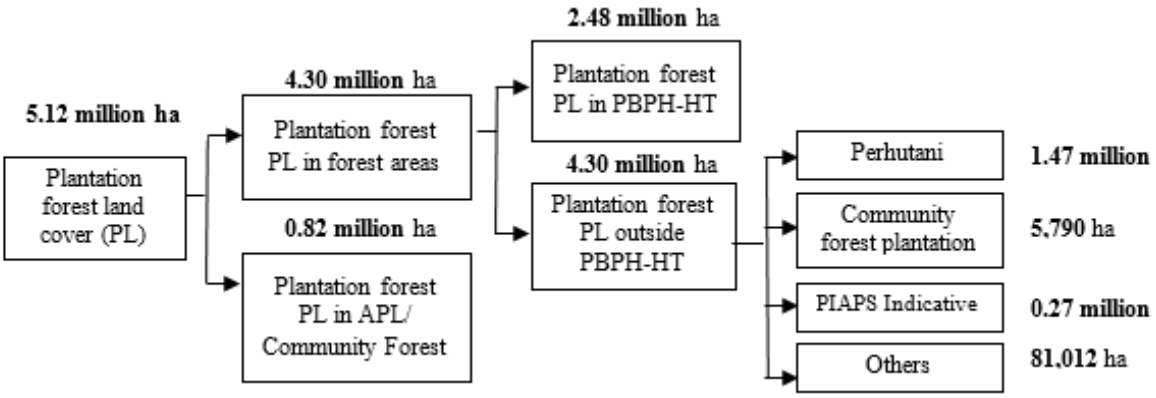


Figure 15. Plantation forest area by function of forest area and type of permit

The process of using templates for determining the location and types of plantation forest development activities can be seen in **Figure 16**. The results of the analysis show that the available area for the implementation of HT development is 2.04 million ha (**Table 107**). Referring to the remaining quota for HT development until 2030, which is 6.11 million ha, the land available to increase the planting area in the PBPH-HT and PIAPS permits currently does not meet the net sink target. Therefore, HT development can be optimised through partnership schemes, especially on land that has already been used by the community and has the potential for conflict. In addition, in order to continue to meet the national timber production target, plantation forest development activities can be aligned with the HTR social forestry scheme, which is part of the rehabilitation mitigation action with rotation (see Subchapter 5.3.4.4).

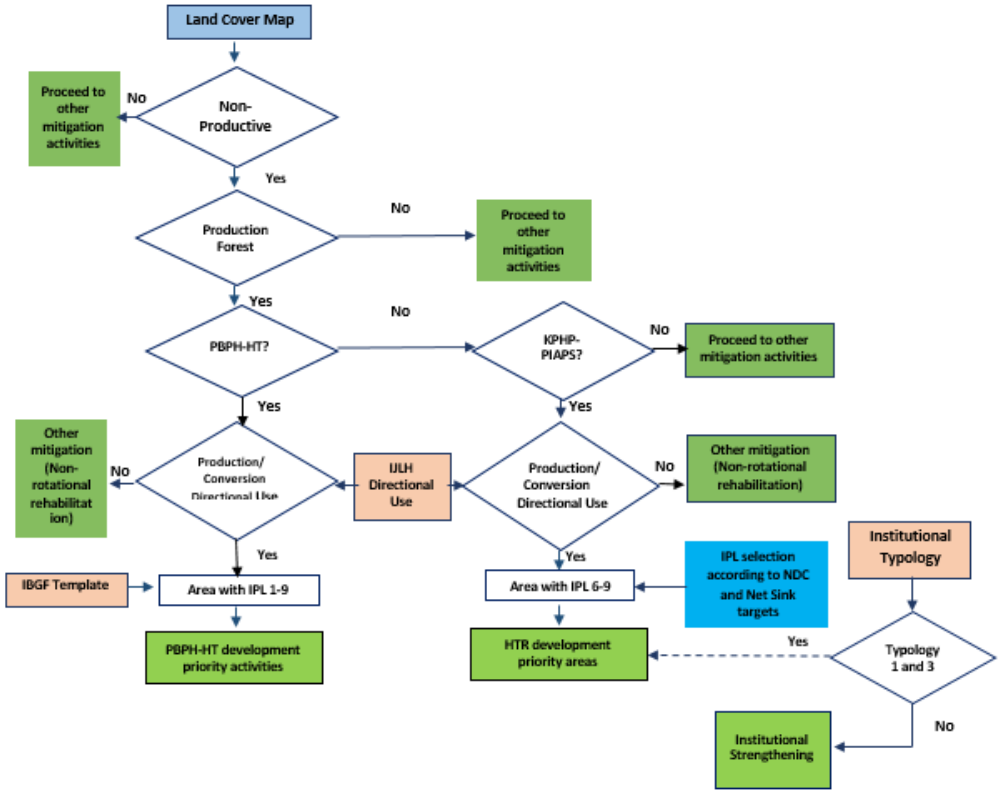


Figure 16. The process of using template in determining the location for the implementation of plantation forest development activities

Note: green box indicates other mitigation actions

Table 107. Total area of mitigation actions for plantation forests development by area managers

Province	NDC-CM1 and Net sink LTS		
	PHL (PBPH-HT)	PSKL (KPHP-PIAPS)	TOTAL (ha)
Aceh	46,130	28	46,158
Bangka-belitung	63,144	27,740	90,885
Bengkulu		8,754	8,754
Special Region of Yogyakarta		6	6
Gorontalo	10,832	6,580	17,411
Jambi	45,999	16,545	62,544
West Kalimantan	126,412	26,847	153,259
South Kalimantan	62,072	14,495	76,567
Central Kalimantan	103,452	122,594	226,046
East Kalimantan	446,411	44,625	491,037
North Kalimantan	46,473	20,707	67,180
Kepulauan Riau (Riau Islands)		27,556	27,556
Lampung	1,633	2,893	4,526
Maluku	47,847	27,954	75,802
North Maluku	5,447	9,970	15,417
West Nusa Tenggara	4,319	2,902	7,221
East Nusa Tenggara	4,913	13,333	18,246
Papua	106,171	204,458	310,629
West Papua	775	7,861	8,636
Riau	22,648	15,687	38,335
West Sulawesi	3,303	492	3,795
South Sulawesi	2,352	9,519	11,871
Central Sulawesi	14,788	13,053	27,841
Southeast Sulawesi	10,031	28,406	38,437
North Sulawesi	704	3,221	3,925
West Sumatra	4,653	4,351	9,005
South Sumatra	154,906	17,696	172,602
North Sumatra	11,012	19,626	30,637
Total (ha)	**1,346,427**	**697,901**	**2,044,328**

4.3.3.1. Directorate General of Sustainable Forest Management (PHL)

The area of non-productive land that can be utilised for expansion of plantation forests in the PBPH-HT area is quite high at around 1.35 million ha, most of which are in the provinces of East Kalimantan and South Sumatra (**Table 108**). One of the effort by the Ministry of Environment and Forestry in supporting EBT is the development of Industrial Plantation Forests (HTI) for Bioenergy or called Energy Plantation Forests (THE). As stated in the Minister of Environment and Forestry Regulation Number 62 of 2019, it explains that plants energy is a plant whose utilisation is directed to meet the needs of renewable energy originating from vegetable sources in the form of biomass, biofuel, and non-timber forest product-producing plants.

However, not all areas are suitable for plantation forest expansion (HT), especially on land with potential conflicts. In areas of potential conflict, HT development becomes economically unfeasible due to the high social costs and transaction costs that must be incurred by the company. In order for the development of plantation forests within the PBPH area to be optimised, the HT development optimisation programme by the Directorate General of PHL (**Table 108**) must be accompanied by an incentive scheme from the government, especially in areas with high conflict risk. Spatial operational planning templates can be used to determine the level of conflict risk based on social capital information. In irder to acceerate the development of Industrial Plantation Forest for bioenergy and Energy Plantation Forest (HTE).

Table 108. Programmes and activities of the Directorate General of PHL related to plantation forest development

No	Programme	Activity
1	Sustainable Production Forest Management and Forestry Business Programme	Timber forest product production (natural forest, plantation forest (including energy forest), community forest, HTR, etc.)
		Optimisation of HT Development (Acceleration of HT Development on Concession Land)
		HT Productivity Improvement
		Preparation of HT Development Monitoring Plans and Reports
		Studies and Research on HT development
2	Development of Energy Plantation Forest (HTE)	Formulation of roadmap/review/revision on accelerated HTE development for PBPH as many as 9 roadmps until 2030
		Facilitation of the acceleration of HTE development in PBPH (socialisation, demonstration plot development, industrial integration) as many as 22 PBPH until 2030
		Facilitation and Guidance/Strengthening of FMUs towards prosperous communities and sustainable forests
		Capacity Building, Development of Energy Plantation Forests on KTH in FMUs and Monitoringand Evaluation for 160 FMUs until 2030

By using a spatial map of operational planning templates, areas that have the potential for conflict can be described by the institutional typology of KPH B1, B2, D1, and D2, where in this area more than 50% of the area is burdened with permits and the community's social capital is already high. Thus, cultivation activities in this area are better carried out with a social forestry scheme in the form of forestry partnerships, which can be proposed either by the concession owner or by the community. Through PerMenLHK No.9/2021, social forestry in concession areas is made possible through a forestry partnership scheme. The principle of forestry partnerships is equality of rights and obligations which must be clearly stated in the Memorandum of Understanding for Cooperation (NKK), where the profit sharing arrangement in forestry partnerships is determined by the presence of assets/capital from the permit holder. In areas where there are assets/capital from the permit holder, the proportion of profit sharing is 80% for the permit holder and 20% for the community. for licence holders. If there are no assets in the forestry partnership area, the profit sharing proportion is 50:50 or according to the agreement between the community and the company.

The forestry partnership scheme can not only be carried out in the PBPH area, but also in the area around the PBPH concession. By increasing PBPH's cooperation with the surrounding community, it is hoped that the net sink scenario plantation development target can be achieved. In order to increase the participation of the private sector in conflict resolution and the fulfilment of the net sink target and national timber production, social forestry activities can be used as an indicator for determining the category of Sustainable Forest Management (PHL) certification for PBPH concession owners.

In addition to social forestry, expansion of plantation forests can also be carried out with a multi-business scheme. Currently, there is 0.45 million ha of plantation and cultivation land in the PBPH-HT area. In this area, a multi-business scheme can be carried out by implementing an agroforestry planting system in the PBPH area. However, plantation forest development activities in this area must be adjusted to the capacity of land that is also used for agricultural land, for example by using the assumption that the area of plantation forest on land already occupied by the community is 30% or only 0.15 million ha. In running the multi-business scheme, PBPH can cooperate (partnership) with local community cooperatives and/or micro, small and medium enterprises (PerMenLHK No. 8/2021).

4.3.3.2. Directorate General of Social Forestry and Environmental Partnership (PSKL)

To achieve the net sink target, plantation forest development cannot only be done in the PBPH area, but also through HTR social forestry. Currently, only 0.7 million ha of the area under PIAPS permits can be utilised for plantation expansion, most of which are in the provinces of Central Kalimantan and Papua (**Table 110**). Thus, it is necessary to accelerate the development of plantation forests with the support of the social forestry acceleration programme from the Directorate General of PSKL in production forest areas that have not been encumbered with permits (**Table 110**). The granting of social forestry permits would be more appropriate for the context of areas with a high/strong level of community utilisation (social capital). The spatial map of the operational planning template can be used to determine areas that can be used as a basis for determining the expansion of plantation forests with high social capital (KPH typologies 1 and 3).

In relation to the Ditjen PSKL programme in the context of business development (**Table 109**), in addition to expanding access to PS, community capacity building activities are needed in the context of trading in timber forest products, including in the certification process to increase the selling value of timber from community plantation forests. In addition to direct activities, the Extension and Human Resources Development Agency also contributes supporting activities in the form of counselling to increase the number and capacity of HT development resources.

Table 109. Programmes and activities of Directorate General of PSKL related to the development of plantation forests

No	Programme	Activity
1	Social Forestry and Customary Forest Business Development	Product value added industry
		Investment/business partnership
		Marketing/Promotion of social forestry products
		Capacity Building (Manage Areas, Institutions, and Businesses) of Community Groups
		Fostering communities around the forest to increase farm productivity
2	Preparation of Social Forestry Area	Providing access to forest area management by the community

4.3.4. Sustainable Forest Management

The target for reducing GHG emissions in NDCs through sustainable forest management activities is in line with the Minister of Environment and Forestry Regulation Number P.8 of 2021 concerning Forest Management and Formulation of Forest Management Plan, and Utilisation of Forest in Protection Forest and Production Forest where emission reductions can occur through the application of logging technology with a minimum level of stand damage and openness of the area. This is in line with indicator 2.4 PHPL (availability and application of environmentally friendly technology for the utilisation of timber forest products). Therefore, indicator 2.4 must be an important indicator to be considered in the process of granting certification. Referring to the regulation, emission reductions through PHPL can occur through efforts to reduce the impact of stand damage due to logging, either by applying RIL technology, or through enrichment efforts ENR if the condition of forest after logging has deteriorated to severe degradation or being at a level that does not allow natural regeneration to ensure sustainable production.

Increasing the uptake of secondary forest, either through enrichment activities or RIL, is one of the key actions for the forestry and land sector in achieving the net sink target. When the availability of land reaches a saturated condition, where almost all of the land has been utilised, the increase in uptake can only be done through the expansion of the secondary forest management area. The targets for implementing PHPL mitigation activities towards net sinks (LTS-LCCP) in 2030 are 3.10 million ha and 2.2 million ha, respectively (**Table 110**).

Based on reports from APHI and certification data for the PBPH-HA area, the cumulative total of SILIN implementation until 2019 was 167,000 ha, while the estimated cumulative total of RIL-C implementation until 2019 was 269, ha. Thus, the implementation of PHL activities required until 2030 is 2.67 million ha for the NDC target and 1.77 million ha for the net sink target.

Table 110. Implementation target of PHL activities for NDC-CM1 and LTS-LCCP

Mitigation action	Total area in 2019 (x 1000 ha)	NDC-CM1 Target (x 1000 ha)			Net Sink Target (x 1000 ha)		
		Cumulative 2024	Cumulative 2030	Remaining quota	Cumulative 2024	Cumulative 2030	Remaining quota
PHL-SILIN	167[1]	1,589	3,105	2,669	1,413	2,207	1,770
PHL-RIL C	269[2]						

Note: [1] Data sourced from APHI activity data; [2] Data obtained from the area of PBPH-HA with good certification status and divided by the period of HA rotation,[3]The remaining quota is the value of the difference between the target area and the realised area.

The spatial analysis of operational planning (see **Figure 13**) yields the area for implementing sustainable forest management per province and type of stakeholder (**Table 111**). The Directorate General of PHL has the highest contribution to the achievement of PHL activities, which is 1.77 million ha. About 85% are in four provinces, namely East Kalimantan, Kaltara, Papua and West Papua. Although in its implementation, PHL activities are prioritised on PBPH permit areas in production forest areas, however, the results of the spatial analysis of the operational planning template show that there are still areas outside the concession that are at high risk in protected forest areas (see **Table 28**) and conservation forests (see **Table 35**). Thus, increasing ambitions for ENR implementation can be carried out outside production forest areas.

Table 111. Total area for the implementation of sustainable forest manageent programme by area managers for the NDC and net sink scenarios

PROVINCE	NDC-CM1						FOLU NET-SINK					
	RIL-C	ENR/SILIN				Total	RIL-C	ENR/SILIN				Total (ha)
	PHL	PHL	PDASHL	KSDAE	PSKL		PHL	PHL	PDASHL	KSDAE	PSKL	
Aceh	409	184	2	-	-	595	409	-	1	-	-	410
Bali	-	-	-	0	-	0	-	-	-	-	-	-
Bangka-belitung	143	16,144	136	17	0	16,440	143	0	52	-	-	195
Banten	-	3	-	0	-	3	-	-	-	-	-	-
Bengkulu	2	95	2	0	20	119	2	-	0	-	0	2
Special region of Yogyakarta	-	-	-	4	-	4	-	-	-	-	-	-
DKI Jakarta	-	-	-	-	-	-	-	-	-	-	-	-
Gorontalo	142	4	-	0	0	146	142	-	-	-	-	142
Jambi	317	16,855	-	0	27	17,200	317	7,091	-	0	11	7,419
West Java	-	29	130	0	-	160	-	-	-	-	-	-
Central Java	-	314	79	-	-	393	-	-	0	-	-	0
East Java	-	13	3	20	-	37	-	-	-	8	-	8

PROVINCE	NDC-CM1						FOLU NET-SINK					
	RIL-C	ENR/SILIN				Total	RIL-C	ENR/SILIN				Total (ha)
	PHL	PHL	PDASHL	KSDAE	PSKL		PHL	PHL	PDASHL	KSDAE	PSKL	
West Kalimantan	11,104	94,173	2	149	264	105,693	11,104	26,334	-	3	212	37,652
South Kalimantan	137	140,604	1	239	1	140,981	137	44,623	-	90	-	44,850
Central Kalimantan	22,596	357,375	21	13	2,038	382,043	22,596	14,880	21	8	1,968	39,473
East Kalimantan	117,091	298,762	0	446	39	416,338	117,091	96,684	0	433	0	214,208
North Kalimantan	328,596	36,978	-	-	8	365,582	328,596	23,575	-	-	-	352,171
Riau Islands	-	1	28	1	0	31	-	-	-	0	-	0
Lampung	-	9	54	214	341	618	-	1	-	1	-	2
Maluku	23,893	12,677	0	0	15	36,585	23,893	-	-	-	-	23,893
North Maluku	25,016	2,150	-	-	0	27,166	25,016	-	-	-	-	25,016
West Nusa Tenggara	1,410	20,552	128	2,100	910	25,100	1,410	-	-	-	39	1,449
East Nusa Tenggara	3,494	8,797	21,395	1,773	11,296	46,755	3,494	71	3,880	5	894	8,344
Papua	506,152	18,116	511	8,153	4,643	537,574	506,152	-	187	-	7	506,347
West Papua	435,191	6,487	6	-	12	441,696	435,191	2	-	-	-	435,192
Riau	-	12,605	65	324	605	13,599	-	12,359	25	0	484	12,868
West Sulawesi	1,596	129	231	-	0	1,956	1,596	-	-	-	-	1,596
South Sulawesi	-	75	1,167	-	148	1,390	-	-	-	-	-	-
Central Sulawesi	37,777	1,056	-	-	0	38,833	37,777	-	-	-	-	37,777
Southeast Sulawesi	5,476	115	0	0	796	6,386	5,476	-	-	-	-	5,476
North Sulawesi	2,680	345	1,571	-	2	4,597	2,680	-	-	-	-	2,680
West Sumatra	724	873	3	-	16	1,615	724	26	0	-	14	763
South Sumatra	63	13,934	638	9	0	14,646	63	7,118	117	0	0	7,299
North Sumatra	445	22,663	984	0	1,128	25,220	445	4,694	313	-	57	5,509
Total (ha)	**1,524,454**	**1,082,115**	**27,157**	**13,464**	**22,308**	**2,669,499**	**1,524,454**	**237,457**	**4,597**	**548**	**3,686**	**1,770,743**

4.3.4.1. Directorate General of Sustainable Forest Management (PHL)

To achieve the target of FOLU Net Sink 2030, the area in protected forest areas for enrichment activities reaches 4,597 ha, most of which are in East Nusa Tenggara Province (**Table 112**). Referring to PerMenLHK No. 8/2021, PBPH licensing in protected forests can be carried out with a forestry multi-business scheme, including the use of environmental services and NTFPs. In order to increase private sector investment to help achieve the net sink target, it is necessary to transform multi-business policies and simplify the process of environmental services business activities.

In protected areas, the area for enrichment activities is 548 ha, of which more than half is located in East Kalimantan Province (**Table 112**). Enrichment activities, both in production forests and protected forests, can be carried out through social forestry schemes and in production forest conservation partnership schemes. Within the PIAPS area, there is a potential for enrichment activities of 3,686 ha, and more than half of them are in Central Kalimantan Province (**Table 112**).

The management of Production Forest and Protection Fotest is carried out by the DG of PHL.In production forest areas, enrichment activities in production forests are carried out through intensive silvicultural activities (SILIN), a technique of planting natural forest enrichment. The Directorate General of PHL has formulated a SILIN road map document to increase natural forest productivity and national natural forest wood production, as well as increase state revenues (Directorate General of PHPL 2019). The results of the spatial template analysis of operational planning can be used to determine the enrichment programme in production forests by the Directorate General of PHL (see **Figure 11**).

The potential area for RIL implementation until 2030 in production forest areas reaches 1.52 million ha, with the highest allocation in the PBPH-HA area (96%; **Table 112**). Meanwhile, SILIN is only about 246 ha. In the PBPH-HT area, there is a potential for the implementation of SILIN until 2030, reaching 118,000 ha which can be implemented through a multi-business scheme (**Table 112**). Based on the Minister of Environment and Forestry Regulation No. 8/2021, the utilisation of timber forest products can be carried out using more than one silvicultural system, including Indonesian Selective Cutting and Planting (Tebang Pilih dan Tanam Indonsia/TPTI) and Line Selecting Planting (Tepang Pilih dan Tanam Jalur/TPTJ), and Gap Cutting (Tebang Rumpang/TR) systems.

In the preparation of the 2nd Forest Reference Emission Level document by the Government of Indonesia, activities to increase uptake in secondary forests are included in additional REDD+ actions. Thus, PBPH owners who carry out enrichment activities can receive payments for environmental services from the REDD+ RBP. In this case, the implementation of PHL can be improved by expanding the provision of access to the management of production forest areas for the use of environmental services.

In PBPH areas with production directions, PHL implementation is carried out through RIL activities. However, unlike SILIN activities, PBPH activities are obliged to carry out the harvesting of timber forest products by applying reduced impcat logging techniques (RIL). The implementation of RIL obligations is accommodated in the clausal which state to carry out obligations as applicable. Through the forestry multi-business scheme, PBPH-HT can carry out business activities using wood from natural forests in areas with the type of optimisation of production areas. To meet the net sink target, the implementation of RIL in the area must be optimised.

Table 112. Total area for the implementation of sustainable forest management programme by area managers for the NDC and net sink scenarios

Province	RIL-C		ENR/SILIN						Total (ha)
	PBPH-HA	PBPH-HT	Non Concession	PBPH-HA	PBPH-HT	PBP H-RE	HPK	Non-HP	
Aceh	354	55	-	-	-	-	-	1	410
Bangka-Belitung	-	143	0	-	-	-	-	52	195
Bengkulu	2	-	-	-	-	-	-	0	2
Gorontalo	-	142	-	-	-	-	-	-	142
Jambi	-	317	977	0	5,040	1,074	-	-	7,419
West Kalimantan	8,328	2,776	103	9	26,078	142	2	-	37,652
South Kalimantan	137	-	128	32,141	12,354	-	-	-	44,850
Central Kalimantan	22,594	2	325	7,516	5,627	0	1,411	21	39,473
East Kalimantan	116,604	487	1,079	42,562	53,042	-	-	0	214,208
North Kalimantan	328,558	38	-	23,575	-	-	-	-	352,171
Lampung	-	-	1	-	-	-	-	-	1
Maluku	15,237	8,656	-	-	-	-	-	-	23,893
North Maluku	25,013	3	-	-	-	-	-	-	25,016
West Nusa Tenggara	852	558	-	-	-	-	-	-	1,449
East Nusa Tenggara	-	3,494	71	-	-	-	-	3,880	8,344
Papua	482,490	23,662	-	-	-	-	-	187	506,347
West Papua	435,171	20	2	-	-	-	-	-	435,192
Riau	-	-	151	4,700	6,257	809	443	25	12,868
West Sulawesi	1,593	3	-	-	-	-	-	-	1,596
Central Sulawesi	19,678	18,098	-	-	-	-	-	-	37,777
Southeast Sulawesi	-	5,476	-	-	-	-	-	-	5,476
North Sulawesi	2,627	53	-	-	-	-	-	-	2,680

Province	RIL-C		ENR/SILIN						Total (ha)
	PBPH-HA	PBPH-HT	Non Concession	PBPH-HA	PBPH-HT	PBP H-RE	HPK	Non-HP	
West Sumatra	723	0	0	-	-	-	26	0	763
South Sumatra	-	63	123	-	6,161	834	-	117	7,299
North Sumatra	369	76	300	-	4,392	-	1	313	5,509
Total (ha)	**1,460,332**	**64,122**	**3,260**	**110,502**	**118,953**	**2,859**	**1,882**	**4,597**	**1,770,743**

In an effort to increase the scope of RIL implementation, incentive schemes are needed to increase private sector participation, for example through simplifying administration and cutting taxes and levies. In addition, increasing the contribution of the private sector in achieving net sinks can also be done by increasing the granting of access to permits in production forest areas that do not yet have a permit, especially in high-risk areas, with the type of utilisation that still adjusts to the characteristics of forest resources and the environment and the criteria for protected areas. Thus, the programme to increase the area of licenced areas in non-productive production forests by the Directorate General of PHL (**Table 113**) can be directed to provinces resulting from the spatial analysis of operational planning (**Table 112)**.

Enhancing ambitions for the implementation of enrichment can be carried out outside production forest. In conservation forest areas, rehabilitation activities through species enrichment can be carried out as part of ecosystem restoration activities aiming at restoring the vegetation structure to its original nature. In the context of conservation, tree seeds and saplings need to be adjusted to the conservation value as animal feed and animal shelters, as well as populations that can enrich and increase species diversity (PerMenLHK No.48/2014).

Table 113. Programmes and activities of the Directorate General of PHL related to sustainable forest management actions

No	Programme	Activity
1	Forestry Industry Business Improvement	Development of non-timber based forestry primary industry
2	Enhancing Environmental Services Business for Production Forest and NTFPs	NTFP Production
3	Enhancing Environmental Services Business for Production Forest and NTFPs	Planting/enrichment in production forest (ENR)
		Implementation of Production Forest Sustainable Management System through Reduce Impact Logging (RIL-C)
		Strengthening Timber Production Systems in Natural Forests (TPTI, TPTJ etc.)
		Addition of Licenced Areas on Non-productive Production Forests
		Fostering forest village communities on NTFP utilisation
		Monitoring and Evaluation of Forest Management Plans (FMU & PBPH)
		Increasing the Number and Capacity of Sustainable Forest Management Resources
		Formulation of Monitoring and Evaluation Plan and report concerning Sustainable Forest Management
		Studies and Research on sustainable forest management
4	Implementation of SILIN technique by PBPH on naturally grown timber	Formulation of roadmap concerning SILIN technique with a total area of 78.000 hectare for the periods 2022-2030
		Guidance and mentoring of 257 PBPH for the periods 2022- 2030
5	Implementation of RIL Technique/RIL C	Formulation of roadmap concerning RIL/RIL-C technique with a total area of 521.874 hectare for the periods 2022-2030
		Guidance and mentoring of 257 PBPH for the periods 2022- 2030

4.3.4.2. Other Directorate General

PIAPS (Indicative Map of Social Forestry Areas) is a map that is an attachment to the Decree of the Minister of Environment and Forestry (LHK) Number 4865 of 2017. This PIAPS is prepared by the DG of PKTL every 6 months based on input from the DG of PSKL who are in charge of PS affairs.

Within the PIAPS area, there are potential enrichment activities covering an area of 3,686 ha, 28% in protected forest areas and 72% in production forest areas (**Table 114**). Within the protected forest area, East Nusa Tenggara Province has the highest potential for enrichment activities, while in the production forest area, Central Kalimantan Province has the highest potential for enrichment activities.

Table 114. Total area of implemented enrichment actions outside the Directorate General of PHL

Province	PSKL			KSDAE	PDASRH	Total (ha)
	KPHL-PIAPS	KPHP-PIAPS	Total (Ha)	Conservation Forest	HL-Non PIAPS	
Aceh	-	-	-	-	1	1
Bangka-belitung	-	-	-	-	52	52
Jambi	-	11	11	0	-	0
East Java	-	-	-	8	-	8
West Kalimantan	3	209	212	3	-	3
South Kalimantan	-	-	-	90	-	90
Central Kalimantan	98	1,871	1,968	8	21	29
East Kalimantan	-	0	0	433	0	433
Lampung	-	-	-	1	-	1
West Nusa Tenggara	-	39	39	-	-	-
East Nusa Tenggara	894	-	894	5	3,880	3,885
Papua	7	-	7	-	187	187
Riau	1	483	484	0	25	25
West Sumatra	-	14	14	-	0	0
South Sumatra	-	0	0	0	117	117
North Sumatra	57	0	57	-	313	313
Total (ha)	**1,060**	**2,627**	**3,686**	**548**	**4,597**	**5,145**

4.3.5. Non-rotational and Rotational Rehabilitation

Non-rotational rehabilitation activities are part of the mitigation action to increase carbon stocks on non-productive land as well as cultivation that is included in the direction of protection and rehabilitation. In accordance with the regulation of the Minister of Environment and Forestry, the priority of implementing rehabilitation activities is directed at critical lands and located in watersheds that need to be restored. In this case, the template needs to be integrated with the thematic maps of degraded land and watersheds restored. Furthermore, rehabilitation activities with rotation are directed at non-productive land that is in the direction of production and conversion in the APL area. For forest areas, rotational rehabilitation is directed at non-productive land, cultivation and plantations in the form of community forests or agroforestry. The implementation of land rehabilitation activities in the area with community involvement or in synergy with social forestry activities requires strong FMU institutions that play a major role in facilitating. The process of using templates in determining the form of rehabilitation activities and implementation priority locations can be seen in **Figure 17**.

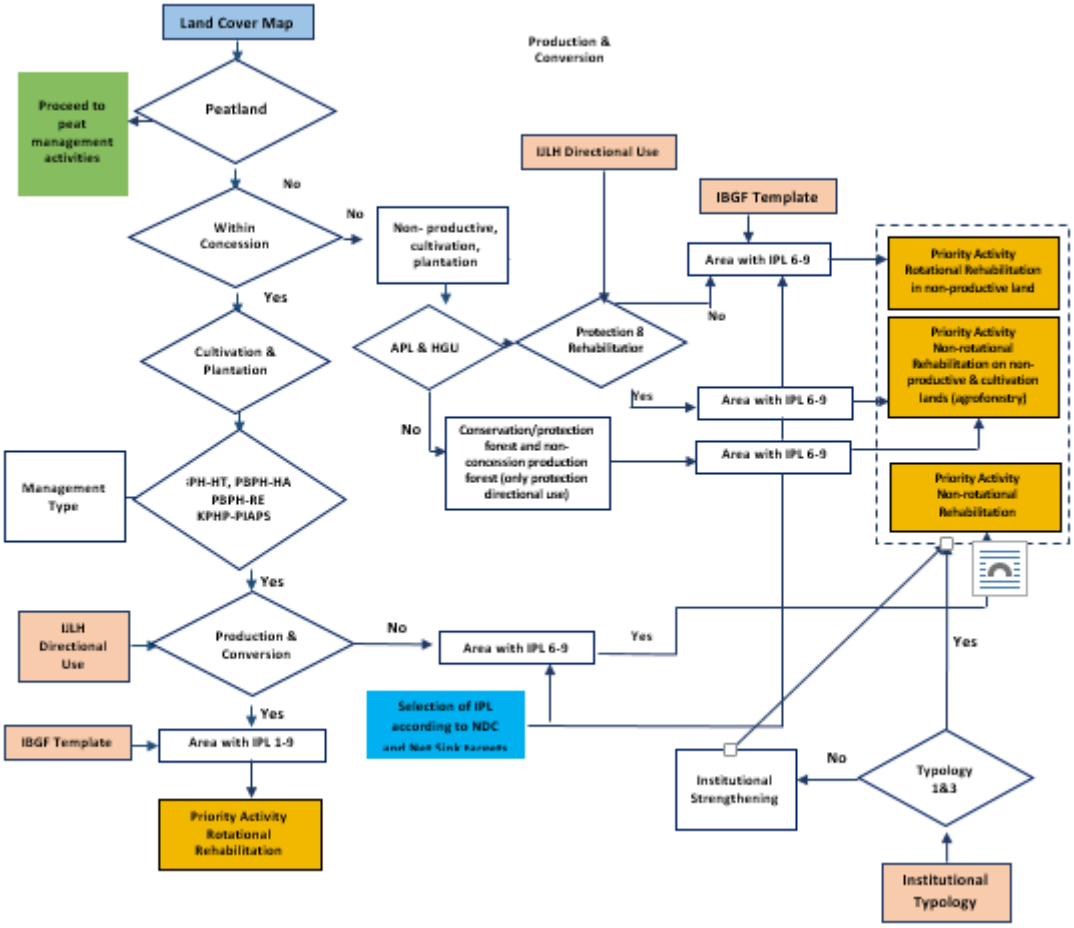


Figure 17. The process of using templates in determining the location for land rehabilitation activities.
Note: green box indicates other mitigation actions.

4.3.5.1. Non-Rotational Rehabilitation

Non-rotational rehabilitation activities are part of the mitigation action to increase carbon stocks aimed at the direction of optimisation of protected areas and rehabilitation. Based on data on the implementation of the NDC and LTS implementation strategies, it is known that the target for non-rotational land rehabilitation activities for NDC-CM1 is 2.07 million ha until 2030, while the target for net sink 2030 (LTS-LCCP scenario) is 2.5 million ha by 2030 (**Table 115**).

Based on data from forestry statistics reports, non-rotational rehabilitation activities until 2019 have reached 0.62 million ha, so that the quota for implementation of the action until 2030 is 1.4 million ha for the NDC-CM1 scenario and 1.8 million ha for the net sink scenario (**Table 115**).

Table 115. Target of non-rotational rehabilitation activities for NDC-CM1 and LTS-LCCP

Mitigation Action	Actual (x 1000 ha)	NDC-CM1 Target (x 1000 ha)			Net Sink Target (x 1000 ha)		
	2011 – 2019	2011-2024	2011-2030	Remaining quota	2011-2024	2011-2030	Remaining quota
Non-rotational rehabilitation	622[1]	1,453	2,076	1,454	1,756	2,509	1,887

Note: [1]Based on forestry statistics reports, consisting of forest rehabilitation activities and land rehabilitation for urban forests (Pusdatin KLHK 2016; Pusdatin KLHK 2018; Pusdatin KLHK 2020). Values have not been corrected for survival rate. Using the assumption of 23% NDC and LTS survival rate, the actual area of non-rotational rehabilitation is 143,000 ha.; [2]The remaining quota is the value of the difference between the target area and the realised area..

The spatial analysis of operational planning for reducing GHG emissions in the forestry and land sector resulted in the implementation of non-rotational rehabilitation areas until 2030 with a total area of 1.89 million ha, with the highest area being in the provinces of Central Kalimantan and Riau (**Table 116**). Referring to **Table 116**, non-rotational rehabilitation activities are mostly carried out in the Ditjen PHL area (0.77 million ha), with the highest implementation areas in Riau and South Sumatra Provinces. The Directorate General of PSKL, through the implementation of the social forestry programme, can contribute to the implementation of non-rotational rehabilitation covering an area of 0.22 million ha with the highest area being in the provinces of Riau and Central Kalimantan.

In addition to production forest, non-rotational rehabilitation activities are also carried out in conservation forest areas (0.65 million ha) under the authority of the Directorate General of KSDAE with the highest area in East Kalimantan, West Kalimantan, and Central Kalimantan. In non-PIAPS protected forest areas, the total area for non-rotational rehabilitation activities is 0.13 million ha, most of which is in Central Kalimantan Province.

Table 116. Total area of implemented non-rotational rehabilitation actions by area managers

Province		NDC-CM1					Net sink LTS					
	PHL	KSDAE	PDASRH	PSKL	PEMDA	Total	PHL	KSDAE	PDASRH	PSKL	PEMDA	Total (ha)
Aceh	-	-	-	-	-	-	-	-	1	-	1,084	1,085
Bangka-Belitung	-	-	-	-	-	-	127	-	969	152	1	1,250
Bengkulu	-	-	1,848	11,243	1,368	14,460	-	-	4,717	19,027	2,165	25,909
Jambi	39,993	20,485	-	3,684	74	64,236	70,375	32,019	14	9,851	1,503	113,762
Central Java	-	-	-	-	-	-	-	-	147	-	-	147
East Java	-	-	-	-	-	-	-	1,842	-	-	-	1.842
West Kalimantan	75,440	136,442	-	6,539	7,000	225,421	92,213	136,758	1,217	10,704	10,162	251,054
South Kalimantan	20,405	3,954	-	344	134	24,837	27,926	8,378	1	1,225	275	37,805
Central Kalimantan	110,405	133,790	39,396	61,750	31,080	376,421	141,157	136,192	41,006	66,108	32,360	416,823
East Kalimantan	42,794	141,216	3,650	698	40,107	228,465	52,104	161,335	5,706	1,173	42,253	262,570
North Kalimantan	-	-	-	-	1	1	-	-	-	-	3	3
Riau Islands	-	-	-	-	-	-	-	731	-	-	1	732
Lampung	4,139	2,187	38	-	2	6,366	6,772	3,418	60	-	3	10,253
Maluku	-	-	-	-	-	-	-	-	-	-	43	43
West Nusa tenggara	-	-	-	-	-	-	-	-	-	375	2	377
East Nusa Tenggara	-	-	-	-	-	-	183	45	1,734	530	3	2,496
Papua	-	-	-	-	-	-	-	-	11,701	5,339	0	17,040
West Papua	-	-	-	-	-	-	147	-	-	-	-	147
Riau	134,027	65,321	-	57,053	19,879	276,281	196,874	94,268	3,831	89,839	22,610	407,423
West Sulawesi	-	-	-	-	-	-	-	-	-	-	472	472
South Sulawesi	-	-	-	-	-	-	-	-	-	-	3,136	3,136
Central Sulawesi	-	-	-	-	-	-	-	-	-	-	11	11
North Sulawesi	-	-	-	-	-	-	-	-	-	-	74	74
West Sumatra	1,397	-	-	137	-	1,534	2,248	-	181	222	498	3,148
South Sumatra	136,158	45,697	14,698	9,473	9,985	216,011	169,495	72,358	29,227	10,279	10,436	291,796
North Sumatra	6,128	-	13,796	42	3	19,969	10,954	-	24,723	1,721	205	37,603
Total (ha)	**570,887**	**549,091**	**73,427**	**150,963**	**109,632**	**1,454,000**	**770,576**	**647,343**	**125,235**	**216,546**	**127,301**	**1,887,000**

4.3.5.1.1. Directorate General of Sustainable Forest Management (PHL)

The broad potential for implementing non-rotational rehabilitation activities in production forest areas under the authority of the Directorate General of PHL to achieve the FOLU Net Sink 2030 until 2030, is 0.77 million ha (**Table 117**). This area is mostly distributed over the PBPH-HT and non-concession areas in 3 provinces, namely Central Kalimantan, Riau and South Sumatra.

The forestry multi-business scheme allows PBPH holders to engage in more than one business activity, including rotational rehabilitation for the use of NTFPs and environmental services. **Table 118** presents a number of programmes and activities of the DG of PHL that relate to, or can support, the successful completion of non-rotational rehabilitation. The results of the template analysis provide guidance on priority locations for implementing these programmes and activities and coordinate with other relevant DGs. Increasing the rate of implementation of non-rotational rehabilitation requires increased access to social forestry, in particular in areas with high social capital, in particular in areas located in KPHs with typology 1 and 2.

Table 117. Total area of implemented non-rotational rehabilitation actions by Directorate General of PHL

Province	HP-Non Concesion	PBPH-HA	PBPH-HT	PBPH-RE	HP-Non KPH (HPK)	Total (ha)
Bangka-belitung	127	-	-	-	-	127
Jambi	2,585	-	57,175	10,615	-	70,375
West Kalimantan	39,918	13	50,775	12	1,494	92,213
South Kalimantan	8,363	569	15,012	-	3,982	27,926
Central Kalimantan	53,064	2,298	20,408	151	65,236	141,157
East Kalimantan	21,865	1,051	26,304	-	2,884	52,104
Lampung	6,772	-	-	-	-	6,772
East Nusa Tenggara	183	-	-	-	-	183
West Papua	147	-	-	-	-	147
Riau	49,855	2,627	89,642	2,573	52,177	196,874
West Sumatra	272	-	0	-	1,976	2,248
South Sumatra	47,139	-	114,440	7,270	646	169,495
North Sumatra	1,137	-	9,576	-	240	10,954
Total (ha)	**231,427**	**6,558**	**383,333**	**20,621**	**128,636**	**770,576**

Table 118. Programmes and activities of the Directorate General of PHL related to non-rotational rehabilitation

No	Programme	Activity
1	Improved Production Forest Management Plan	Effective FMU organization
2	Enhancing Environmental Services Business for Production Forest and NTFPs	NTFP Production
3	Sustainable Forest Management and Forestry Business Programme	Area Development for Non-Timber Forest Products (NTFPs) in Protection Forest
		Implementation of Production Forest Ecosystem Restoration

4.3.5.1.2. Directorate General of Watershed Management and Forest Rehabilitation (PDASRH)

Referring to **Table 119**, the total contribution of PDASRH to the implementation of the non-rotational rehabilitation is 0.13 million ha by 2030. About 75% of this area lies in three provinces: Central Kalimantan, South Sumatra and North Sumatra. The rehabilitation activities of the Directorate General of the PDASRH are prioritised in the areas with certain criteria (restored critical watershed, disaster-prone areas, lake damage, etc.). Additional thematic maps are needed to refine the renops model so that the activity objectives of the PDASRH can be adjusted to the priority agenda of the DG of the PDASRH. **Table 119** presents several PDASRH programmes and activities related to non-land rehabilitation.

The important role of rehabilitation in increasing the land absorption to achieve the net sink goal indicates the need for contributions from other area managers, one of which is by synergising the RHL programme with social forestry schemes. With reference to PerMenLHK No. 105/2018, requests for proposed RHL activities may be submitted by community group leaders with social forestry licences. Synergies in the financing of RHL and PS activities can also be achieved on the basis of PerMenLHK No. 2/2020 and PerMenLHK No. 9/2021. In this case, the synchronisation of RHL and PS activities may be used as a new criterion for determining the status of effective KPH.

In addition to planting activities, the Directorate General of PDASRH has also built a Community Seedling Garden (KBR) with an area of 25 thousans per year, which is intended to encourage the community to develop independent nurseries to carry out planting. Through the synergy between the social forestry programme and the RHL programme, PS groups can receive incentives in the form of seeds from KBR.

According to the RPJMN document, the expected intensive activity of RHL is only 171,000 ha for 5 years or 34,000 ha per year. Another source of RHL activities comes from the Forestry Revenue Sharing Fund (PSDH), Reforestation Fund (DR) and Forest Concession Permit Fee (IIPH). Currently, it is necessary to seek other sources of funding for RHL activities, including through partnership activities with private parties. The high target of non-rotational rehabilitation activities requires the transformation of funding policies, including increased funding sources from the Ministry of Finance and diversifying other funding sources from CSR (eg palm oil and mining associations, airline companies, etc.) are urgently required.

Table 119. Programme and activities of the Directorate General of PDASRH related to non-rotational rehabilitation actions

No.	Programme	Activity
1	Development of Inland Water Damage Control	Lake degradation control
2	Implementation of Forest Rehabilitation and Reclamation. Land Rehabilitation. Watershed Planning and Inland Water Damage Control	Rehabilitation of forests and lands, and ecosystem restoration within the State Capital (IKN)
		Restoration of forests and critical lands within watersheds (DAS)
		Restoration of degraded areas for water source protection
		Rehabilitation of forests and critical lands in vulnerable /post-hazardous areas
		Study and research on rehabilitation activities using regeneration

Forest and Land Rehabilitation (RHL) was also supported by policies and measures in the provision of plant seeds and identified the need for large-scale nurseries or modern nurseries. Modern Nurseries (PM) and Permanent Nurseries (PP) in addition to producing ready-to-plant seeds also produce seedlings (saplings) to be distributed to RHL, KBD and KBR locations which are then maintained until ready for planting. This pattern guarantees the quality of seeds and seedlings because it is more controlled.

The President of the Republic of Indonesia directed on November 19, 2021 to build 30 nurseries until 2024, in an effort to restore the environment through large-scale RHL. The construction of large-scale nurseries is carried out with a PPP pattern, namely Government Cooperation with Business Entities. Development in the pattern of public-private-partnership schemes with examples in Rumpin, Bogor Regency, West Java Province and the Rumpin Nursery has been built as an example in private cooperation.

The basic technical specifications of the nursery are that: a) the seeds are produced to support Forest and Land Rehabilitation and disaster management; b) production targets for each nursery of 10-15 million seedlings per year (except in certain provincial areas of 5 million seeds); and c) types of seed plants include: c.1.) endemic species, local superior plants such as: meranti, gaharu, sandalwood, kempas, manglid, suren, ebony, ironwood/bulian, and others; c.2) types of plants with high economic value for the community (NTFPs) that support a green economy, such as Durian, Duku, Mangosteen, Cempedak, Jackfruit, Mango, Avocado, Matoa, Jengkol, Pete, Breadfruit, Nutmeg, etc.; and c.3.) types of aesthetic plants to support special purposes, such as Tabebuya, Flamboyan, Spatodea, Cambodia, Ketapang Kencana, Palm/Pinang, Banyan, and others.

Development with a public-private partnership pattern, involving Ministries/Agencies, Local Governments, BUMS/BUMN where the land or location is provided by the Ministry of Environment and Forestry.

Previously, the President of the Republic of Indonesia since 2019 has given directions for the development of modern nurseries and has started piloting in 5 tourist destination areas, namely Lake Toba North Sumatra, Labuan Bajo NTT, Mandalika NTB, Likupang North Sulawesi and the State Capital in East Kalimantan. In 2021 what has been built is Lake Toba with the 2020 and 2021 APBN funds. In general, the large-scale PPP nursery development plan is in **Table 120**.

Table 120. Nursery development plan with KPBU form in 2022-2023

No.	Province	Location Candidate (Indicative)	Area (Ha)	Critical Land Area (Ha)	Annual Seedling Production Target (Million seedllings)	Land Status
Development Year 2022						
1	East Kalimantan (IKN)	Mentawir Village, Sepaku District, North Paser Sharpening	120	275.414	15	Production Forest Area (KHP)
2	NTB (Mandalika)	Rembitan Village and Sengkol Village, District Pujut, central Lombok	30	512.775	10	Protected Forest Area (KHL)
3	Jambi	Sungai Gelam Village, Sungai Gelam District, Muaro Jambi	13,3	215.133	10	KHP
4	Central Java	Desa Salak Lima Vilage, Giripurwo, Wonogiri District, Wonogiri	10-12	440.208	5	KHP
5	Lampung	Way Kandis Village, Tj. Senang District, Bandar Lampung City, Lampung, Lampung Selatan	10,60	400.923	10	KHP
6	Central Kalimantan	Hampangen Village, Katingan Hilir District, Katingan	10	847.753	15	KHP
7	West Kalimantan	Melawi, Sanggau	10	993.897	15	KHP
8	North Kalimantan	Bulungan District	10,6	198.715	5	KHP
9	East Java	Malang/Kediri District	27/6	403.991	5	KHP
10	South Sumatra	Talang Ubi District, Penukal Abab Lematang Ilir (PALI)	14,76	709.884	15	KHP
11	South Borneo	Pemuda Village, Pelaihari District, Tanah Laut	10	582.723	10	KHL
12	Southeast Sulawesi	Bau Bau/Kolaka Timur	10	309.201	10	KHL
13	Riau	Dayun, Kabupaten Siak, Riau	10	537.654	10	KHP
Development Year 2023						
1	Sulawesi Tengah	Lebagu Village, Balinggi District, Parigi Mautong	10	367.251	10	KHP
2	Aceh	Aceh Tengah/ Langsa City	10	327.349	10	KHP
3	Sumatera Barat	Pasilihan, X Koto Diatas, Solok District, Sumatera Barat	10	561.356	10	Areal Penggunaan Lain (APL)/KHP
4	Gorontalo	Bihe Vilalge, Asparaga District, Gorontalo	10	217.022	10	KHP
5	Sulawesi Barat	Salulekbo, Topoyo, Kabupaten Mamuju, Sulawesi Barat	10	101.903	5	KHP
6	Sulawesi Selatan	Pucak Village, Tompobulu District, Maros	10	383.804	10	KHP
7	Papua	Hinekombe Village, Sentani District, Jayapura	5	393.371	5	APL
8	Papua Barat	Batulobang, Sorong City	5	435.678	5	KHP
9	Bangka Belitung	Jurung, Merawang, Bangka District, Kepulauan Bangka Belitung	10	161.485	5	APL/KHP
10	Bengkulu	Pagar Gn., Kepahiang District, Kepahiang	10	162.901	5	APL
11	Kepulauan Riau	Ekang Anculai, Teluk Sebong, Bintan, Kepulauan Riau	10	46.114	5	APL/KHP
12	Maluku Utara	Domato Villagr, Jailolo Selatan District, Halmahera Barat	5	387.888	5	KHP
13	Maluku	Lohiatala, Kairatu Bar. District, Seram Bagian Barat	10	298.423	5	KHP

4.3.5.1.3. Directorate General of Conservation on Natural resources and Ecosystem (KSDAE)

The potential for the rehabilitation of non-rotational areas to meet the FOLU Net Sink 2030 under the Directorate General of KSDAE is 0.65 million ha (**Table 121**). The largest areas are in the provinces of West Kalimantan and Central Kalimantan.

On the basis of PerMenLHK No.48/2014, in forest conservation areas, restoration activities are carried out on ecosystems with moderate to serious damage levels, What is indicated by the disturbance of damage to the function of the area as habitat and territorial area for wildlife and significant changes in population dynamics of keystone species in less than five years. In addition, non-rotational rehabilitation activities can also be conducted on open land that has been used by the community through a conservation partnership scheme under the social forestry programme. Referring to PerDirJen KSDAE No.6/2018, the conservation partnership process can be in the form of community empowerment programmes or Cooperation Agreement (in traditional block) with an emphasis on conflict resolution and partnerships for the use of NTFPs, or conservation in ecosystem restoration (rehabilitation zones) with the primary goal of gradual restoration of functional ecosystems.

Within the community empowerment agenda, conflict resolution becomes the primary urgency, through a persuasive approach. In practice, this programme can be harmonised with RHL activities, but it must nevertheless be adapted to the context of conservation, for example the location of wildlife corridors. Ecosystem restoration conservation programmes can also focus on NTFP, to align conservation activities with the economic activities of communities.

A number of related Directorate General of KSDAE programmes and activities that may support the implementation of non-rotational rehabilitation activities are presented in **Table 121**. The results of the template analysis can be used to guide the target location for the implementation of activities, in which the primary target area is an area with high emission risk and absorption potential associated with strong social capital and institutional capacity at the site level.

Table 121. Programmes and activities of the Directorate General of KSDAE related to non-rotational rehabilitation actions

Programme	Activity
Protected Area Management	Rehabilitation of forest and land, and ecosystem recovery in the State Capital (IKN)
	Rehabilitation of forest and critical land in protected and protection areas
	Restoration of protected area ecosystem/restoration of protected area
	Restoration of flora & fauna habitat
	Enrichment planting in Essensial Ecosystem areas
	Enhancement of region vegetation cover through reservation of biological natural resources in the area
	Management of wildlife habitat through wildlife feed enrichment
	Recovery through rehabilitation of degraded or fragmented wildlife habitat

4.3.5.1.4. Directorate General of Social Forestry and Environmental Partnership (PSKL)

Within the Directorate General of PSKL, the potential rotational rehabilitation area for the FOLU Net Sink 2030 is 0.22 million ha (22,000 ha per year; **Table 122**). Of this, about 81% are in production forest areas and 19% are in protection forest areas (**Table 122**). More than 80% of the area are situated in three provinces, Riau, Central Kalimantan and Bengkulu, of which all are areas for Social Forestry activities. Non-rotational rehabilitation may take the form of planting activities for the use of NTFPs, namely through village forests, community forests, forestry partnerships for NTFPs and environmental services located in protection forests.

Table 122. Total area of implemented non-rotational rehabilitation actions by the Directorate General of PSKL

Province	KPHL-PIAPS	KPHP-PIAPS	Total (ha)
Bangka-belitung	26	126	152
Bengkulu	18,962	65	19,027
Jambi	-	9,851	9,851
West Kalimantan	697	10,008	10,704
South Kalimantan	201	1,024	1,225
Central Kalimantan	7,181	58,927	66,108
East Kalimantan	1,071	101	1,173
West Nusa Tenggara	162	213	375
East Nusa Tenggara	530	-	530
Papua	5,339	-	5,339
Riau	3,151	86,688	89,839
West Sumatra	11	211	222
South Sumatra	361	9,918	10,279
North Sumatra	1,677	44	1,721
Total (ha)	**39,370**	**177,176**	**216,546**

The DG of PSKL in the 2020-2024 RPJMN has compiled programmes and activities to support social forestry activities as indicated in **Table 123**. Locations for implementation of activities should also be in synergy with the activities of other DGs by using the results of the directional use for non-rotational location activities in the template. The acceleration of access to PS will also depend on the funding sources. It is expected that the PS programme will not rely solely on APBN funding to facilitate activities. Another option would be to distribute PS funding through BPDLH. For the time being, the distribution of capital funds for PS is limited to HTR and HR and does not yet fall under the NTFPs. The high interest in the use of wood in Social Forestry stems from the public perception that wood is the fastest-growing commodity. Currently, plants composition is not mentioned in detail in PerMenLHK No. 9 of 2021 concerning implementation of social forestry. It is therefore important to incorporate elements of the NTFP into Social Forestry programmes, particularly in the context of national efforts to achieve food diversification objectives.

Table 123. Programmes and activities of the Directorate General of PSKL related to non-rotational rehabilitation actions

No	Programme	Activity
1	Social Forestry and Customary Forest Business Development	Product value added industry
		Investment/business partnership
		Marketing/promotion of social forestry products
		Capacity building (area management, institutions, and businesses) of community groups
		Fostering communities around the forest to increase farm productivity
2	Preparation of Social Forestry Area	Providing access to forest area management by the community

4.3.5.1.5. Local Government

A total of 127,000 ha of potential APL areas in the high priority area were identifiied for rehabilitation and protection for the implementation of non-rotational rehabilitation activities to achieve the FOLU Net Sink 2030 target. In this area, approximately 75% are located in three provinces, namely East Kalimantan, Central Kalimantan and Riau (**Table 124**). With reference to Act No 26/2007, local governments are responsible for preparing land use plans according to the main functions of the protection and cultivation areas. Protection areas include allocations for environmental conservation activities, including areas of protection such as peat and water catchment areas, nature reserves and cultural heritage areas, etc.

Similarly, efforts in structuring the restoration of the area with an approach to improving water quality through eco-riparian programmes, such as those carried out in Karawang, Bogor, Indramayu and others. This development pattern can be carried out through partnership support, APBN and APBD as well as CSR and KPBU.

Table 124. Total area of non-rotational rehabilitation actions by the local government (Pemda)

Province	PEMDA-HGU	PEMDA Non HGU	TOTAL (ha)
Aceh	1,049	21	1,070
Bali	-	-	-
Bangka-belitung	1	-	1
Banten	-	-	-
Bengkulu	2,165	-	2,165
Special Region Yogyakarta	-	-	-
DKI Jakarta	-	-	-
Gorontalo	-	-	-
Jambi	1,481	3	1,485
West Java	-	-	-
Central Java	-	-	-
East Java	-	-	-
West Kalimantan	5,863	4,296	10,159
South Kalimantan	168	106	274
Central Kalimantan	25,691	6,662	32,353
East Kalimantan	36,098	6,142	42,240
North Kalimantan	-	3	3
Kepulauan Riau (Riau Islands)	1	-	1
Lampung	3	-	3
Maluku	42	-	42
North Maluku	-	-	-
West Nusa Tenggara	1	-	1
East Nusa Tenggara	3	-	3
Papua	0	-	0
West Papua	-	-	-
Riau	5,363	17,248	22,610
West Sulawesi	466	-	466
South Sulawesi	3,095	-	3,095
Central Sulawesi	-	11	11
Southeast Sulawesi	-	-	-
North Sulawesi	73	-	73
West Sumatra	491	-	491
South Sumatra	10,435	-	10,435
North Sumatra	196	7	202
Total (ha)	**92,689**	**34,499**	**127,187**

Table 125. Programmes and activities of the Directorate General of PPKL related to non-rotational rehabilitation actions

No	Directorate General/Agency	Programme	Activity
1	Environmental Pollution and Degradation Control Environmental Pollution and Degradation Control	Open Access Land Degradation Recovery	Number of industries that carry out land damage control and mine reclamation
			Increasing the area of reclaimed abandoned land used by communitys mining
		Recovery of degraded ex-mines	Establishment of recovered land management institution
			Management of mining industry through PROPER
			Calculation of land cover quality index
2	Extension and Human Resources Development	Enhancement of extension programme	Increase in quantity & resource capacity for rehabilitation activities using regeneration

4.3.5.2. Rotational Rehabilitation

Rotational rehabilitation activities are part of mitigation actions to increase carbon stocks in areas identified by the IJLH as production areas. The rotational reclamation activities to be undertaken through 2011-2030 to meet the NDC-CM1 emission reduction target are 3.46 million ha, while to reach the FOLU Net Sink 2030 (LTS-LCCP scenario) required an area of 2.787 million ha (**Table 126**). According to forestry statistics, rotational rehabilitation until 2019 has reached 2.73 million ha, thus the quota for implementation of activities up to 2030 is only 0.72 million ha for NDC-CM1 scenario and 52,000 ha for the net sink scenario (**Table 126**).

Table 126. Implementation target for rotational rehabilitation activities for NDC-CM1 and LTS-LCC

Mitigation action	Actual (x 1000 ha)	NDC-CM1 Target (x 1000 ha)			Net Sink Target (x 1000 ha)		
	2011 – 2019	2011-2024	2011-2030	Sisa kuota	2011-2024	2011-2030	Sisa kuota
Rotational rehabilitation	2,734,992[1]	2,422	3,460	725	1,951	2,787	52

Note: [1] Based on the 2015 2017 and 2019 forestry statistics reports for land rehabilitation activities for community forests (Pusdatin KLHK 2016; Pusdatin KLHK 2018; Pusdatin KLHK 2020). Values have not been corrected for survival rate. Using the assumption of a 55% NDC and LTS survival rate, the actual area of rotational rehabilitation is 1.5 million ha. [2]The remaining quota is the value of the difference between the target area and the realised area.

The implementation of rotational rehabilitation activities can be led to support the achievement of industrial timber production considering that the land available in PBPH-HT and PIAPS described in subsection 5.3.3 is insufficient. Additional land is still required to develop 4.07 million ha of plantation forestsy. Aligning the implementation of rotational rehabilitation activities with the development of the plantation forests, The area needed will be 4.79 million ha to achieve the NDC-CM1 target and 4.12 million ha for the net sink target.

According to the analysis of the template, the area of implementation of the rehabilitation with rotation to reach the FOLU Net Sink 2030 target is 4.12 million hectares distributed in almost all provinces (**Table 127**). The largest areas are found within four provinces that make up over 75% of the total area, namely East Kalimantan, Central Kalimantan, West Kalimantan and South Sumatra. According to the stakeholders of the area, the area to be rehabilitated with the highest rotation is under the authority of the DG of PHL covering an area of 2.05 million ha followed by areas under the jurisdiction of the regional government, which amounts to 1.99 million hectares. In the meantime, the area under the authority of the DG of PSKL is 77,000 ha (**Table 127**). In more detail, the breakdown of the rehabilitation with rotation implementation area for each stakeholder is described in the following subchapter.

Table 127. Total area of implemented rotational rehabilitation actions by area managers

Province	NDC-CM1				Net sink LTS			
	PHL	PSKL	PEMDA	TOTAL	PHL	PSKL	PEMDA	TOTAL (ha)
Aceh	456	-	120,051	120,506	-	-	105,720	105,720
Bali	-	-	218	218	-	-	108	108
Bangka-belitung	13,149	230	11,269	24,648	1,331	166	9,122	10,619
Banten	3,255	-	-	3,255	-	-	-	-
Bengkulu	1	-	45,770	45,771	-	-	42,778	42,778
Gorontalo	-	-	54	54	-	-	-	-
Jambi	149,347	4,888	101,589	255,824	138,174	4,808	98,080	241,062
West Java	538	-	25	563	-	-	-	-
Central Java	697	-	13	710	-	-	-	-
East Java	3,240	-	49	3,288	-	-	-	-
West Kalimantan	727,010	60,436	164,522	951,968	644,271	58,234	152,718	855,223
South Kalimantan	174,805	720	87,535	263,061	152,617	668	76,848	230,133
Central Kalimantan	628,123	6,598	338,582	973,303	513,712	5,855	334,533	854,100
East Kalimantan	299,433	17	819,011	1,118,462	224,863	17	807,347	1,032,227
North Kalimantan	37	31	16,047	16,114	-	-	6,365	6,365
Kepulauan Riau (Riau Islands)	68	-	63,755	63,822	-	-	45,115	45,115
Lampung	3,876	17	18,530	22,423	3,311	-	16,388	19,699
Maluku	13,123	192	19,694	33,008	-	-	12,663	12,663
North Maluku	6,431	-	2,419	8,850	-	-	-	-
West Nusa Tenggara	2,407	192	6,333	8,931	-	13	3,957	3,970
East Nusa Tenggara	888	181	73,620	74,689	271	-	17,611	17,882
Papua	29,963	0	13,722	43,685	-	-	12,433	12,433
West Papua	845	-	2,038	2,883	98	-	-	98
Riau	107,959	7,979	16,812	132,750	102,063	7,953	16,796	126,812
West Sulawesi	-	-	11,317	11,317	-	-	10,387	10,387
South Sulawesi	7,302	0	37,857	45,159	-	-	27,833	27,833
Central Sulawesi	189	-	1,872	2,061	-	-	-	-
Southeast Sulawesi	236	1	5,954	6,191	-	-	-	-
North Sulawesi	-	216	8,767	8,983	-	-	3,700	3,700
West Sumatra	1,453	0	23,296	24,750	1,420	0	15,490	16,910
South Sumatra	276,087	18	177,103	453,207	248,106	1	167,604	415,711
North Sumatra	46,516	4,571	20,613	71,699	20,807	16	6,827	27,649
Total (ha)	**2,497,433**	**86,287**	**2,208,434**	**4,792,154**	**2,051,043**	**77,730**	**1,990,424**	**4,119,197**

4.3.5.2.1. Directorate General of Sustainable Forest Management (PHL)

Rehabilitation activities with rotation in production forest areas, aim at achieving national objectives of timber production through monoculture and agroforestry in social forest scheme under the authority of the Directorate General of PSKL. The results of the template analysis show that the area for the implementation of rehabilitation activities with the highest rotation under the Directorate General of PHL is spread over the PBPH-HT area of 1.24 million ha. More than half of the area is in the province of West Kalimantan, whereas in the PBPH-HA, it reaches 0.32 million hectares, and most of these are in the provinces of Central and East Kalimantan (**Table 128**). In the PBPH RE area, the rehabilitation area with rotation is just 22,000 ha, of which more than half is in the province of Jambi. In the meantime, the area to be rehabilitated with rotation in the production forests outside the concession is 0.15 million ha, and in the HPK area 0.32 million ha (**Table 128**).

Table 128. Total area of implemented rotational rehabilitation actions by the Directorate General of PHL

Province	HP-non Consession	PBPH-HA	PBPH-HT	PBPH RE	HP-non KPH (HPK)	TOTAL
Bangka-belitung	1,331	-	-	-	-	1,331
Jambi	6,453	-	117,662	14,059	-	138,174
West Kalimantan	18,777	52	612,703	1,970	10,770	644,271
South Kalimantan	12,892	67,397	67,926	-	4,403	152,617
Central Kalimantan	65,461	119,660	71,072	3,418	254,102	513,712
East Kalimantan	31,616	132,917	36,368	-	23,962	224,863
Lampung	3,311	-	-	-	-	3,311
East Nusa Tenggara	271	-	-	-	-	271
West Papua	98	-	-	-	-	98
Riau	1,473	1,181	92,336	-	7,073	102,063
West Sumatra	0	-	-	-	1,420	1,420
South Sumatra	4,126	-	237,259	3,320	3,400	248,106
North Sumatra	389	-	8,304	-	12,114	20,807
Total (ha)	**146,198**	**321,205**	**1,243,630**	**22,768**	**317,243**	**2,051,043**

To meet national objectives for timber production and expansion of plantation forest areas, areas of PBPH permits with crops and plantation land coverage or areas that have been used by the community may still be used by the social forestry partnership scheme. According to PerMenLHK No.9/2021, in social forestry areas only agroforestry systems are permitted and monocultures are not allowed. Thus, the composition of the plantation forest in the social partnership area must be adjusted to the cultivation activities and community preferences. In practice, forest partnerships are not limited to lands within the PBPH concession area and may occur on community lands outside the concession.

Table 129. Programmes and activities of the Directorate General of PHL related to rotational rehabilitation actions

No	Programme	Activity
1	Enhancement of Forestry Industries	Development of timber-based forestry industry
		Market development and improvement of timber forest products supply chain
2	Enhancing Environmental Services Business for Production Forest and NTFPs	Planting/enrichment of production forest
3	Sustainable Production Forest Management and Forestry Business Programme	Timber forest product production (natural forest, plantation forest (including energy forest), community forest, htr, etc.)
		Development of community nursery garden (KBR)
		Granting of social forestry permit
4	Forest utilisation through Rotational Rehabilitation	Technical guidance on forest utilisation in HT rotational rehabilitation activities covering an area of 3.4 million hectares for the period 2022 to 2030
		Formulation/review/revision of NSPK for Forest Utilisation Business at PBPH with a target of 9 NSPKs for the period 2022 to 2030
		Preparation of roadmap/review/revision of the Acceleration of Implementation of Forestry Multi-Business Activities at PBPH with a target of 9 Roadmaps for the period 2022 to 2030
		Facilitation on the implementation of Forestry Multibusiness at PBPH
		FMU coaching and mentoring (including FMU capacity building, training, technical guidance, etc.) with a target of 90 FMU units for the period 2022 to 2030
		Agroforestry support at site level (KTH nursery, nursery, planting, maintenance) with a target of 90 FMU units for the period 2022 to 2030

Several programmes and activities of the DG of PHL related to rotational rehabilitation (**Table 129**) should pay attention to the results of the site selection templatel analysis provided in **Table 128**. In addition to the expansion of plantation forest areas, further programmes are required for PBPH concession owners and community plantation forests. These programmes aimed at increasing forest production activities by developing markets and increasing the value chain of timber and non-timber products. which is part of the DG of PHL programme (**Table 129**). In addition, the DG of PHL has also contributed to the development of the Community Seedling Gardens (KBR) to encourage an increase in the area of community plantation forests and community forests.

4.3.5.2.2. Directorate General of Social Forestry and Environmental Partnership (PSKL)

On the basis of PerMenLHK No.9/2021, rehabilitation activities with rotation may be conducted in social forestry areas through the implementation of HTR. referring to **Table 130**, to achieve the FOLU 2030 net sink, the implementation area of the rotational rehabilitation activities in the PIAPS area is 77,000 ha. It is possible to increase the ambition to implement rotational rehabilitation by broadening the area of access to management of social forest areas, which is part of the DG of PSKL programme (**Table 130**) which can be prioritised in high priority areas (IPL 7-9).

At present, social forestry activities are on the agenda of the national Economic Recovery (PEN) and will receive a budget of 24 billion to ensure access, business development facilities, group business development including institutions, preparation of management plans and provision of incentives in the form of Social Forestry Development Management Programme (Bang Pesona) and productive economic tools.

Table 130. Programmes and activities of the Directorate General of PSKL related to rotational rehabilitation actions

No	Programme	Activity
1	Social Forestry and Customary Forest Business Development	Product value added industry
		Investment/business partnership
		Marketing/promotion of social forestry products
		Capacity building (area management, institutions, and businesses) of community groups
		Fostering communities around the forest to increase farm productivity
2	Preparation of Social Forestry Area	Providing access to forest area management by the community

Within the framework of the Social Forestry programme, cultivation activities can received Bang Pesona assistance of 50 million IDR and productive economic tools for 100 million IDR. In accordance with the institutional classification, social forestry is divided into blue, silver, gold and platinum groups, which are distinguished on the basis of the progress of the preparation of the Social Forestry Work Plan (RKPS) and the development of business and products. The difference in classification will determine the amount of mentoring funds, where mentoring funds will be higher for the higher PS classes. Social forestry programmes, particularly for HTR management, can also receive capital funds from BPDLH, Although currently, it remains limited to delayed logging loans to reduce intermediary intervention.

In addition to expanding access to PS, the Directorate General of PSKL must also play a role in bringing together PS groups with companies that have the potential as offtakers through regular meetings. Companies that meet and partner with the PS group may be selected based on the company's PROPER assessment, i.e. companies with good ratings (green and gold).

In addition to direct programmes, the expansion of the rehabilitation area of rotation requires supportive activities from the Extension and Human Resources Development Agency to increase the number and capacity of forestry extension workers and from the DG of PPKL by creating a synergy between mine reclamation activities and mitigation action through rotational rehabilitation (**Table 131**). One of the mining reclamation activities is conducted through recovery (rehabilitation) of damaged mining areas, both on licenced mining areas and unlicenced mining areas. Recovery of damaged ex-mining land in licenced mines, is carried out by mining permit holders in ex-mining areas that are their concession areas and carried out in accordance with their designation.

Table 131. Programmes and supporting activities related to rotational rehabilitation actions

No	Directorate General/Agency	Programme	Activity
1	Extension and Human Resources Development Agency	Improvement of Extension Services	Increase in number and capacity resources for rotational rehabilitation
2	DG of Environmental Pollution and Degradation Control	Reclamation of Defraded Open Access Land	Number of industries implementing landl degradation control and mine reclamation activities
			Increased areas of recovered abandoned community ex-mining land
			Rehabilitation/ reclamation of ex-mining areas

4.3.5.2.3. Local government

In implementing rehabilitation with rotation until 2030, local governments have a high contribution of 1.99 million hectares (0.20 million ha per year), of which 1.64 million hectares are located outside the HGU area and most are in the provinces of Central and East Kalimantan, And a surface area of 0.35 million ha is in the HGU area, of which over 50% is in the province of East Kalimantan (**Table 132**). With reference to Act No 26/2007, local governments are responsible for drawing up land use plans, according to the main functions of the area which are divided into protection areas and cultivated areas. The primary role of cultivated areas is to harness the potential of natural resources. In order to achieve the objective of plantation forest development and national timber production, rehabilitation activities with rotation in APL areas can be directed towards community forestry development.

4.3.6. Peatland Management

Peatland management is a key mitigation measure that drives the success of the forestry and land sector toward a net sink. Through PerMenLHK No. 15/2017, owners of PBPH and HGU licences whose presence in a peat ecosystem is indicated, shall maintain water level of the peat in their area not exceeding 40 cm, by improving the peatland water system. The mitigation action of maintaining the water level will result in reduced emissions compared to the baseline water level for commercial crop cultivation.

Furthermore, according to the MoEF Regulation Number 16 of 2017 concerning Technical Guidelines for the Restoration of Peat Ecosystem Functions, Restoration of Peat Ecosystem Functions is an activity carried out to restore the nature and function of the Peat Ecosystem according to or close to the original nature and function through natural succession, hydrological restoration, rehabilitation of vegetation, and/or other methods in accordance with the development of science and technology. Natural succession is recovery without human intervention.

Hydrological Restoration is an effort to restore the peatland water system to make the Peat Ecosystem or its parts wet and function again as before. Vegetation Rehabilitation is an effort to restore and improve the function of the Peat Ecosystem through planting vegetation so that productivity and its role in supporting life support systems are maintained.

Table 132. Total area of implemented rotational rehabilitation action by the local government (Pemda)

Province	PEMDA Non HGU	PEMDA-HGU	TOTAL (ha)
Aceh	100,745	4,976	105,720
Bali	108	-	108
Bangka-belitung	9,122	-	9,122
Bengkulu	42,778	-	42,778
Jambi	97,500	580	98,080
West Kalimantan	96,692	56,026	152,718
South Kalimantan	74,249	2,599	76,848
Central Kalimantan	290,948	43,585	334,533
East Kalimantan	590,533	216,824	807,347
North Kalimantan	-	6,365	6,365
Kepulauan Riau (Riau Islands)	35,900	9,215	45,115
Lampung	16,388	-	16,388
Maluku	12,663	-	12,663
West Nusa Tenggara	3,957	-	3,957
East Nusa Tenggara	17,611	-	17,611
Papua	6,539	5,894	12,433
Riau	13,893	2,903	16,796
West Sulawesi	10,387	-	10,387
South Sulawesi	27,833	-	27,833
Central Sulawesi	3,700	-	3,700
West Sumatra	15,490	-	15,490
South Sumatra	167,604	-	167,604
North Sumatra	6,185	642	6,827
Total (ha)	**1,640,824**	**349,600**	**1,990,424**

On degraded peatlands, due to conversion of land cover, drainage or fire, restoration actions are necessary to restore and improve the function of the peat ecosystem, namely through wetting and planting of commodities that are adaptive to the natural characteristics of peatlands or known as paludiculture. Successful implementation of water management policies and implementation of peatland restoration will reduce the risk of peatland fires. In the context of net sinks, peatland fires must reach zero by 2030, so the net sink target for peatland management actions must be met.

With reference to the goal of improving water management in peatlands, the LTS-LCCP scenario sets a more ambitious target of 0.95 million ha by 2030, compared to the NDC-CM1 scenario that covers just 0.86 million hectares (**Table 133**). The net sink scenario also sets a higher target for peatland restoration activities at 2.72 million ha by 2030, compared to the NDC-CM1 scenario which is only 1.40 million ha (**Table 133**).

Table 133. Mitigation targets for the management of peatland for NDC-CM1 and LTS-LCCP

Mitigation Action	Actual (x 1000 ha)	NDC Target (x 1000 ha)			Net Sink Target (x 1000 ha)		
	Up to 2020	Cumulative 2024	Cumulative 2030	Remaining Quota	Cumulative 2024	Cumulative 2030	Remaining Quota
Perbaikan tata air lahan gambut	N.A.	864	864	N.A.	785	946	N.A.
Restorasi lahan gambut	835[1]	977	1,395	560	1,996	2,724	1,889

Note: [1]BRGM Achievement Report 2016-2020, [2]The remaining quota is the value of the difference between the target area and the realised area.

Based on the 2017-2019 activity report of the Peat and Mangrove Restoration Agency (BRGM), BRGM and its coordinating partners undertook restoration activities covering an area of 835,000 ha on settlement area (village, APL). Thus, to meet the net sink target, the remaining peatland restoration activities to be undertaken by 2030, amount to 1.89 million hectares (**Table 133**).

Figure 18 illustrates the process of using templates to determine the form of management activities in peatlands and the priority locations for implementation. Activities to improve water management in peatlands were mandated by PerMenLHLK No 15/2017 with implementation area occurs within the PBPH licensing area. Thus, on the basis of this rule, all peat areas that have been cultivated by holders of plantation and plantation forest licences have set up a system to improve water management. Potential peat areas necessary to improve water management currently reaches 1.67 million hectares, which accounts for approximately 57% in the HGU area and 43% in the PBPH-HT (**Table 135**). This area exceeds the target of net sink (0.16 million ha per year).

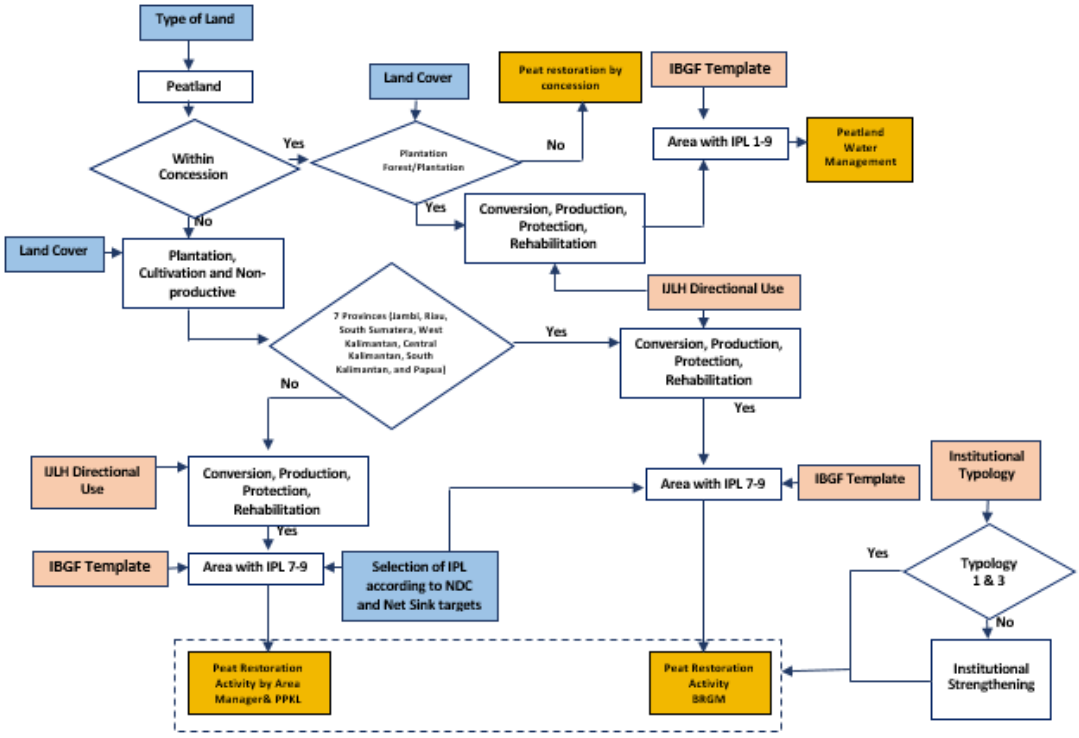


Figure 18. The process of using templates to determine the location for the implementation of peatland management activities

Currently, water level observation points for national peatlands are still very limited, while the contribution of the peat ecosystem to the development of net sink is very significant, requiring proper monitoring. To increase the quantity and quality of peat water level monitoring data, it is important to incorporate the data recorded by the company, the DG of PPKL and BRGM. The collection and pre-processing of observational data and data loggers can be used to produce a national hydrologic monitoring system for peatlands that can be used as higher tier data for the national GHG inventory.

Furthermore, the results of the spatial analysis of the operational planning template show the area for the implementation of peat restoration to achieve the NDC CM1 target of 0.56 million hectares and the Indonesia's FOLU Net Sink 2030 target of 1.89 million hectares, most of which are in Central Kalimantan, South Sumatra, Raiu Province. and West Kalimantan (**Figure 18** and **Table 134**). The widest area is under the authority of BRGM, reaching almost 75% of the total target.

In the context of the distribution of restoration implementation areas, BRGM is responsible for the implementation of restoration in non-licenced areas in 7 Indonesia provinces (Riau, Jambi, South Sumatra, West Kalimantan, Central Kalimantan, South Kalimantan, and Papua), both within forest and outside of forest area. Meanwhile, the DG of PPKL conducts restoration activities in peatlands of non-licenced APL areas and outside of the 7 provinces covered by the BRGM.

Table 134. Total area of implemented peatland water system improvement actions by the area managers

Province	NDC-CM1 and Net sink LTS		
	PHL (PBPH-HT)	PEMDA-HGU	TOTAL (ha)
Aceh		31,558	31,558
Jambi	57,333	47,558	104,891
West Kalimantan	35,571	272,691	308,263
South Kalimantan		64	64
Central Kalimantan		51,386	51,386
East Kalimantan		7,952	7,952
North Kalimantan	13,289	31,620	44,909
Papua		1,062	1,062
Riau	294,164	432,620	726,784
West Sumatra		13,018	13,018
South Sumatra	317,541	24,735	342,276
North Sumatra	123	42,417	42,540
Total (ha)	**718,021**	**956,682**	**1,674,703**

The DG of PHL, including the PBPH permit area, contributed to the implementation of peatland restoration covering a total area of 0.44 million ha, with the highest area lies in the provinces of West Kalimantan and Riau (**Table 136**). In the field of social forestry, the DG of the PSKL contributed to the restoration of 0.24 million ha of peatlands, mainly in the province of Central Kalimantan. Through efforts to improve the peatlands ecosystem as an integral part of essential ecosystem, the DG of KSDAE has implemented a total of 9,000 ha of peatland restoration in East Kalimantan Province.

Table 135. Total area of implemented peatland restoration actions under the NDC-CM1 scenario by area managers

Province	NDC-CM1						Total (ha)
	PHL	KSDAE	PSKL	PPKL	BRGM	PEMDA	
Jambi	42	-	124	-	272	-	438
West Kalimantan	396	-	1,100	-	1,113	779	3,388
South Kalimantan	-	-	8	-	1,026	-	1,034
Central Kalimantan	177	-	6,497	-	307,363	6,799	320,836
East Kalimantan	627	325	-	32,608	-	138	33,699
Riau	377	-	284	-	49,004	346	50,012
South Sumatra	4,246	-	1,202	-	145,600	-	151,049
North Sumatra	-	-	21	-	-	-	21
Total (ha)	**5,866**	**325**	**9,235**	**32,608**	**504,379**	**8,063**	**560,475**

Table 136. Total area of implemented peatland restoration actions under the net sink scenario by area managers

Province	Net sink LTS						Total (ha)
	PHL	KSDAE	PSKL	PPKL	BRGM	PEMDA	
Jambi	15,421	-	6,125	-	43,200	2,644	67,390
West Kalimantan	34,464	-	12,480	-	60,658	59,418	167,021
South Kalimantan	-	-	238	-	6,611	-	6,849
Central Kalimantan	13,054	-	129,331	-	550,355	13,666	706,407
East Kalimantan	1,364	9,351	-	32,757	-	3,978	47,449
Lampung	-	-	-	7,064	-	-	7,064
Riau	258,987	-	55,491	-	229,893	32,550	576,921
South Sumatra	122,841	-	34,858	-	150,882	-	308,581
North Sumatra	687	-	811	398	-	-	1,897
Total (ha)	**446,819**	**9,351**	**239,334**	**40,219**	**1,041,600**	**112,256**	**1,889,578**

4.3.6.1. Directorate General of Sustainable Forest Management (PHL)

A more detailed analysis of the distribution of restoration implementation locations shows that the PBPH permit area contributes to peatland restoration activities by 2030 covering an area of 0.44 million ha in the PBPH-HT area, most of which occured in South Sumatra Province. Of this, a total of 62,000 ha located within the area of PBPH-HA which mostly found in Riau Province, and a total area of 15,000 ha within the PBPH-RE area, with the highest implementation area in Central Kalimantan Province (**Table 137**). Outside the PBPH area, peatland restoration was implemened in the HPK forest areas with a total of 1,438 ha, while a further 12 ha have been implemented in the non-concession production forest areas (**Table 137**).

Table 137. Total area of implemented peatland management action programme with the area under the jurisdiction of Directorate General of PHL

Province	HP-Non Konsesi	PBPH-HA	PBPH-HT	PBPH-RE	HP-Non KPH (HPK)	Total (aa)
Jambi	-	14,221	1,200	-	-	15,421
West Kalimantan	-	397	34,067	-	-	34,464
Central Kalimantan	-	-	8,001	5,053	-	13,054
East Kalimantan	-	-	601	-	763	1,364
Riau	-	47,819	201,705	9,463	-	258,987
South Sumatra	-	-	121,488	1,352	-	122,841
North Sumatra	12	-	-	-	675	687
Total (ha)	**12**	**62,437**	**367,062**	**15,869**	**1,438**	**446,819**

Referring to PerMenLHK No. 10/2019, PBPH-HT permit holder that performs cultivation activities at the top of the peat dome, must perform restoration activities at the end of the rotation/felling, while PBPH-HT who have conducted cultivation activities outside the top of the peat dome, but are located under the the protection ecosystem function, are required to complete the restoration at the expiry of the permit. Through the forestry multi-business programme, the peat ecosystem in the PBPH area, particularly those with degraded conditions, can be restored by rewetting and planting of paludiculture commodities and other possible silviculture techniques that based on technological development for the use of NTFPs and environmental services.

In addition to the PBPH area, PerMenLHK No. 10/2019 also mandates the HGU permit holder to carry out restoration activities at the end of the permit in the area of the top of the peat dome which has been used for cultivation activities. As mentioned in **Table 137**, there are restoration activities in the 0,95 million ha of HGU area. In carrying out restoration activities, the DG of PPKL contributes to providing guidance to PBPH and HGU permit holders to prepare recovery plan documents, revise the RKU PBPH, and carry out peatland restoration.

4.3.6.2. Directorate General of Watershed Management and Forest Rehabilitation (PDASRH)

Although there are no allocations for the implementation of restoration activities under the DG of PDASRH, nevertheless, the DG of PDASRH can still performed peat restoration activities in protection forest areas. Using spatial maps of operational planning as shown in **Table 138** the relevant programmes for peatland management by the DG of PDASRH (plantation of endemic species on peatland or paludiculture and other possible silvicultural techniques based on technological developments and construction of canal blocking) can be directed at areas with high IBGF Fire. Peatland restoration activities also need to be in line with peatland conservation activities, especially in areas that are within one ecosystem boundary or the Peat Hydrological Unit (KHG).

Table 138. Programmes and activities of the Directorate General of PDASRH related to peatland management

Programme	Activites
Implementation of Forest Rehabilitation and Reclamation, Land Rehabilitation, Watershed Planning, and Inland Water Damage Control	Technical civil engineering of forest and land rehabilitation
	Vegetative forest and land rehabilitation
	Mangrove/beach forest rehabilitation
	Adaptive/endemic species planting in peatland ecosystem
	Groundwater level and canal block regulation
	Canal block construction

4.3.6.3. Directorate General of Social Forestry and Environment Partnerships (PSKL)

Increasing ambition for peatland restoration can be carried out by directing peat ecosystem restoration activities in Social Forestry areas through the Community Forest (HKm) scheme for the directional use of NTFP utilisation. The DG of PSKL has contributed to the implementation of peatland restoration, covering an area of

43,000 ha in protection forest areas and 0.19 million ha in production forest areas—most of which are in Central Kalimantan Province (**Table 139**). In the process of accelerating the access grant to social forestry, a spatial map of operational planning templates can be used by PS groups to prepare RKPS and business types in accordance with the direction map for forest area optimisation.

Currently, the Social Forestry programme has not differentiated the composition of plants, cost standards, and types of SF facilitation on mineral lands and peatlands. The implementation of peatland restoration activities in social forestry areas requires more specific guidelines on cultivation activities that are in accordance with the natural characteristics of the peatland ecosystem. In addition, to increase community participation in Social Forestry on peatlands, an incentive mechanism is needed due to the high investment required, especially for the development of good water management technology.

Table 139. Total area of implemented peatland restoration actions by the Directorate General of PSKL

Province	KPHL-PIAPS	KPHP-PIAPS	Total (ha)
Jambi	-	6,125	6,125
West Kalimantan	-	12,480	12,480
South Kalimantan	238	-	238
Central Kalimantan	42,550	86,781	129,331
Riau	-	55,491	55,491
South Sumatra	-	34,858	34,858
North Sumatra	792	20	811
Total (ha)	**43,579**	**195,755**	**239,334**

4.3.6.4. Directorat General of Environmental Pollution and Degradation Control (PPKL) and Peatland restoration Agency (BRG)

In the process of carrying out peatland management activities, the DG of PPKL synergises with BRGM in preparing the National Peat Ecosystem Protection Plan (RPPEG) that will be used as a guide by provincial and district governments to formulate strategic issues and directions for the use and restoration of peatlands. Therefore, RPPEG needs to be integrated with regional spatial planning. The preparation of the RPPEG is determined based on the type of peatland ecosystem function, which consists of a protection function and a cultivation function.

Referring to the allocation table for peatland restoration actions (**Table 140**), the implementation of peatland restoration by the DG of PPKL is 34,000 ha until 2030, while BRGM has the highest contribution of 1.35 million ha. To improve the welfare of the people on peatlands, the DG of PPKL and BRGM has implemented the Desa Mandiri Cares for Peat (DMPG) programme (**Table 141**), with the achievement that 640 DMPGs have been formed in 2020. The DMPG programme aims to develop peatland planning up to the village level, with good outcomes expected to be in the form of village regulations on the use and protection of peatlands. Through the DMPG programme, BRGM also implements a peat farmer field school, accompanied by the preparation of a working group for peat product business development.

Table 140. Programmes and activities of the Directorate General of PPKL related to peatland management

Programme	Activity
Pollution Control and Peatland Damage	Number of businesses and/or activities that meet the requirements for peat ecosystem restoration
	The area of peatland facilitated through peat restoration in 7 fire-prone provinces
	Peatland area recovered from degradation
	Establishment of peat care independent villages in 12 provinces
	Establishment of peat care independent villages in 7 for peatland restoration priority provinces
	Fire Prevention Patrol in Forest and Peatland Area
	Establishment of a Fire Care Society (MPA)
	Moratorium on Peatland Use Permits
	Study and research on peatland restoration activities
	Preparation of Monitoring and Evaluation Plans and Reports for peatland management activities
Recovery of Damaged Lands	Rehabilitation of ex-mining land in non-forest concession areas: 10,000 ha/year until 2024 and 10,642 hectares until 2030
	Rehabilitation of ex-mining land in non-forest non-concession areas 100 ha per year until 2030
	Development of 191.109 ha of green open space until 2030
	Biodiversity-based green open space development through CSR: 286,468.90 until 2030
	Rehabilitation of karst ecosystem with a total area of 547 ha per year until 2030
	Management of stakeholders in order to prevent deforestation from other use areas as many as 85 industries per year until 2030
Peatland Ecosystem Protection and Managementt	Inventory of Peatland Ecosystem Characteristics and Determination of Peatland Ecosystem Function Map 1:50,000: 865 KHG can be carried out an inventory of peat ecosystem characteristics and Determination of Peatland Ecosystem Function Map at 1:50,000 scale as stipulated in PP 71/2014 junto PP 57/2016 concerning Protection and Ecosystem Management Peatland with the support of APBN funding and Hiba
	Determination of RPPEG Province and District/City: RPPEG can be established in all provinces and districts/cities in 2030, as the basis for determining the Regional Medium Term Development Plan (RPJMD)
	Peatland Ecosystem Quality Index (IKEG): The national average value of the Peatland Ecosystem Quality Index (IKEG) until 2030 is 70.8
	Peat Ecosystem Restoration in APL with Peat Care Independent Village
	Recovery in Concession Areas Number of Companies: 500 companies until 2024, 750 HT and Plantation companies with an area of 1,328,264.81 ha until 2030 using funding from APBN and grants, it is expected that all companies in 2030 have implemented restoration of the peatland ecosystem

Funding for the DMPG is only carried out for one year, while at least 3–5 years of assistance is needed for each village to ensure the sustainability of the programme. In order for the DMPG to easily receive incentives from the government, it is necessary to synchronise the DMPG programme with the Climate Village Programme (PROKLIM). To enable the synchronisation process between DMPG and PROKLIM, the role of a facilitator from the MoEF is needed to provide socialisation of the PROKLIM registration process to the SRN system.

Currently, BRGM is also developing the concept of the Peat Hydrological Unit (KHG) for a systematic and integrated restoration model based on the concept of integrated water management in 5 KHGs in Indonesia. With the model KHG system, it is believed that there will be clarity on the institutional system and parties involved in implementing ecosystem-based restoration activities. In this case, the spatial map of the operational planning template can be used to identify actors involved in KHG-based peatland management.

In addition to direct action programmes on peatland restoration, the Extension and Human Resources Development Agency needs to expand its extension workers to support the DMPG programme and the DG of Conservation of Natural Resources and Ecosystems (KSDAE) related to the protection of peat ecosystems as part of the essensial ecosystem (**Table 141**).

Table 141. Programme and supporting activities related to peatland management

No	Directorate General/Agency	Programme	Activity
1	Extension and Human Resources Development	Improvement of Extension Services	Increasing the Number & Capacity of Resources for peatland restoration activities
			Increasing the Number & Capacity of Resources for peatland management activities
2	Conservation of Natural Resources and Ecosystem (KSDAE)	Management of Essensial Ecosystem Conservation	Improving the Effectiveness of Essential Ecosystem Management
3	Peatland Ecosystem Degradation Control	Environmental Pollution and Degradation Control	Improvement of the Quality of Land Cover and Peatland Ecosystem
		Peatland Degradation Control	Mapping of the peatland ecosystem characteristics in the KHG using a scale of 1:50,000. The total target for 2016-2024 is 500 KHGs with APBN funding and 865 KHGs have completed in 2024 with other funding sources (Grants)
			Preparation of RPPEG with a target of 19 RPPEGs until 2024
			Provision of Peatland Ecosystem Quality Index (IKEG) data with yearly target on 19 provinces
			Restoration of peatland ecosystem until 2024 with expected area of 1.2 million hectares on community land with support from APBN and grant fundings
			Establishment of peat-care independent villages in 12 provinces. The target Number of peat-care independent villages by 2024 with the support of APBN and Grant Fundings for 600 Villages
			Implementation of performance monitoring of peatland management for businesses and/or activities. The total target number of companies by 2024: all companies of peatland ecosystem. The total restored area will be known after the discussion of the peatland ecosystem restoration documen

4.3.7.Mangrove Management

Mangroves have enormous potential to show Indonesia's ambitions in climate change mitigation actions. The reason is that mangroves have not been included in the calculation of legally binding targets under the NDC and Indonesia's goals under the LTS-LCCR. Optimising the role of mangroves will be a real addition to Indonesia's role in climate change actions.

Given the impact caused by the damage to the mangrove ecosystem is very broad, the mangrove ecosystem must be managed and used wisely and sustainably. One of the policies in managing mangroves includes carrying out a mangrove forest rehabilitation programme that aims to restore damaged mangrove forests. Other policies that can be adopted to protect mangroves include developing policies and regulatory frameworks, considering local conditions and wisdom, informing the community of benefits that mangroves can offer, involving them in management, increasing productivity, strengthening cooperation, especially in mangrove rehabilitation activities and law enforcement measures.

Mangrove rehabilitation does not only involve planting but also considers the mangrove landscape. Mangrove landscape, namely a social-ecological system consisting of a mosaic of natural and man-made ecosystems with characteristics of topographic configuration, vegetation, land use, and settlements as a result of ecological, historical, and economic, social and human activities processes in the area.

Rehabilitation of mangroves can also be approached from other important uses, namely reducing greenhouse gas emissions nationally by preparing the widest

possible mangrove plants to absorb and store carbon. This is much preferable rather than wasting them into the atmosphere to cause emissions that damage the ozone layer in the atmosphere and also lead to climate change impacts. According to several studies, mangrove forests are able to absorb carbon emissions of 4–5 times greater than mainland forests. Although Indonesia only has a mangrove forest area of +2.0% of our total forest, it is able to store carbon by 10% of all existing emissions.

With enormous natural potential, Indonesia can contribute to dealing with climate change. Currently, a mangrove rehabilitation programme has been implemented with a target area of 600,000 ha. Mitigation efforts by increasing carbon stocks are part of the forest and land rehabilitation (RHL) activities, including mangrove rehabilitation in coastal areas, as well as the development of industrial forest plantations on land with low carbon reserves. Based on Act Number 41 of 1999 in article 40, it is stated that RHL activities are an effort to restore, maintain, and improve the functions of forests and land so that their carrying capacity, productivity, and role in supporting life support systems are maintained.

The purpose of implementing RHL is to reduce forest and land degradation and restore damaged/critical lands so that they can function as production media and water management media. RHL activities are directed at restoring damaged/critical lands that function as production media. After rehabilitation, NTFPs and their environmental services will be utilised, while those directed at water management media will be maintained as protected/conservation areas that cannot be used for timber production.

RHL activities for the restoration of production functions in the NDC are referred to as ‘rotational rehabilitation’ activities, while those of water management functions and other environmental services are ‘non-rotational rehabilitation’activities.

During the Indonesian Presidency of the 2022 G-20 meeting and as the host nation, a case study on managing the Mangrove Conservation Forest Area in Pemogan, South Denpasar, Denpasar City, Bali, will be presented to heads of state/government and world leaders as a spot location for meetings, world’s leaders from Group of Twenty (G20).

The Tahura Ngurah Rai mangrove area and its various activities will be a testament to Indonesia’s strong commitment to climate change, as demonstrated by efforts to restore mangrove forests, rehabilitate mangrove forests, restore peat forests, and restore critical lands in Indonesia. The success of mangrove management in Bali will, at the same time, provide an overview of Indonesia’s development commitment with the principle of a balance of economic development and environmental conservation.

In order to save mangrove ecosystems both in Indonesia and in the world, it is necessary to take concrete, clear, and implementable steps, which include: (1) establishment of policies and regulatory frameworks in managing mangrove ecosystems that are adapted to local conditions and wisdom in each country; (2) propose measures to increase the use of non-timber forest products and environmental services that mangroves can provide in the community’s economy; (3) enhance awareness and community involvement in its management so that people feel they have access to economic, environmental, and social benefits; (4) providing clear boundaries related to mangrove logging; (5) increasing mangrove productivity through technology development; (6) establish, enhance, and strengthen cooperation

both at home and abroad, which are directed at mangrove rehabilitation activities; (7) enhance fair and transparent law enforcement efforts.

4.3.8. Biodiversity Conservation

Biodiversity conservation is part of the national development programme, which is part of a sustainable forest management programme that includes: 1) nature conservation design and information; 2) protected area management; 3) species and genetic conservation, and 4) utilisation of Conservation Forest environmental services. It is also part of a programme that improves the quality of the environment through efforts to foster the conservation of essential ecosystems.

Biodiversity conservation can be viewed from a variety of perspectives within the context of action to reduce greenhouse gas emissions from the forestry and land sectors, ranging from the conservation of wild plants and animals, habitat conservation and protection, to involving local communities and mainstreaming local wisdom. Based on the analysis of ecosystem environmental services, many regions outside of conservation forest areas have high conservation value and become pockets of wildlife habitat and essential ecosystem areas. Therefore, they need to be the centre of the target for implementing biodiversity conservation activities.

Using area optimisation directional use maps and biogeophysical indexes, spatial analysis of operational planning for reducing GHG emissions in the forestry and land sector resulted in the area for implementing biodiversity conservation actions to be of high-risk IPL (IPL 6-9), which is 1.5 million ha (**Table 142**). **Table 142** shows that there are currently 38 million ha of high conservation value (BKT) areas, of which 1.5 million ha are in high-risk areas and must be protected. Based on data from the DG of KSDAE, more cases of animal deaths are found outside protected areas. Therefore, the protection of BKT areas outside the area is very important, including ensuring that protected animals do not leave the corridor.

Several scheme options that can be carried out for the development of new conservation areas according to the type of forest area function are:

1. Grand Forest Park (Tahura)

   BKT areas located within HL, HP, and APL areas can be proposed to become Tahura, through the Regent (non-cross-jurisdictional BKT) or Governor (cross-jurisdictional BKT). The proposal to convert the BKT area to Tahura can ensure that land cover remains forested, as opposed to not proposing Tahura that has the potential to be converted, particularly those within the function of APL and HPK areas.

2. Adjustment in spatial planning into green space

   Based on Act No.26/2007, there are two main types of area functions: protected areas and cultivated areas. BKT areas that are outside the function of conservation forest areas can be protected by including the area as a green/protection area in the Regional Spatial Plan (RTRW). Referring to PerMenLHK No.29/2009, local governments are mandated to compile a profile of biodiversity (kehati) with local government budget (APBD) funding, with the output in the form of a biological

management plan. After compiling the profile of the river, the local government must produce a master plan for biodiversity management.

Table 142. Total area of implemented biodiversity conservation programme

Province	High conservation value area	High-risk areas for unplanned deforestation[1]	Low risk areas for unplanned deforestation[2]
Aceh	2,137,496	36,977	1,617,144
Bali	75,216	4	74,435
Bangka-belitung	97,453	15,002	24,396
Banten	2,773	-	2,773
Bengkulu	230,670	49,349	135,434
DKIi Jakarta	19	-	18
Gorontalo	378,994	-	229,055
Jambi	430,805	84,690	29,157
West Java	59,357	-	59,239
Central Java	42,726	1,507	38,499
East Java	176,516	-	171,923
West Kalimantan	3,750,874	156,078	1,215,248
South Kalimantan	379,994	15,243	143,741
Central Kalimantan	4,742,583	364,072	298,714
East Kalimantan	3,598,988	280,609	531,529
North Kalimantan	1,476,885	-	132,635
Kepulauan Riau (Riau Islands)	89,768	3,288	31,090
Lampung	58,781	3,620	38,178
Maluku	683,571	811	141,236
North Maluku	488,092	-	255,277
West Nusa Tenggara	402,011	654	213,840
East Nusa Tenggara	448,971	20,896	211,442
Papua	8,233,406	99,617	5,345,254
West Papua	2,108,431	-	924,241
Riau	953,554	192,475	124,518
West Sulawesi	476,043	5,061	268,437
South Sulawesi	1,096,253	12,993	915,595
Central Sulawesi	2,077,234	-	708,926
Southeast Sulawesi	1,350,164	-	881,131
North Sulawesi	154,557	687	30,294
West Sumatra	809,620	27,898	380,268
South Sumatra	341,646	131,142	125,539
North Sumatra	976,096	24,264	557,178
Total (ha)	**38,329,548**	**1,526,940**	**15,856,380**

Note: [1]Natural forest with protection directional use (IPL 6-9) outside conservation forest area

3. Essensial Ecosystem

Currently, the DG of KSDAE is preparing directional use for essential ecosystems (wetland ecosystems, landscape corridors, ABKT, wildlife parks, and landscapes with geological and geomorphic specificity), which are identified as being outside conservation forest areas. Management of essential ecosystems is followed by restoration of protected areas (PerMenLHK No.48/2014).

4. High Conservation Value Area

   Based on PP No.18/2021 and, within the HGU area, the holder of the right to cultivate is obliged to manage, maintain, and monitor the function of the high-value conservation area. In addition, through PerMentan No.38/2020, environmental and biodiversity management are part of the ISPO certification criteria. Through this policy, conservation areas within HGU are not allowed to be converted.

5. Arrangement and control of fragmentation of wildlife habitat in forest concession areas.

   As per the President's policy, large-scale business licences or private/corporate forest concession areas have been controlled. This is primarily aimed at more equitably distributing access to regions for the community's welfare, as well as structuring in the context of expanding protected areas and regulating habitat fragmentation. Within the framework of this control, policies are developed by taking into account wildlife corridors that must be protected and become a consideration in regional planning; as well as determining requirements for road construction types such as fly-overs or under-passes that are unavoidable to open isolation or main connecting roads between regions.

4.3.8.1. Directorate General for Conservation of Natural Resources and Ecosystem (KSDAE)

The DG of KSDAE has a mandate to formulate and implement policies for the conservation of natural resources and ecosystems. In 2015–2019, the DG of KSDAE set a target for ecosystem restoration of 100,000 ha with a realisation figure of 87,000 ha. For the 2020–2024 period, the DG of KSDAE targets 200,000 ha of ecosystem restoration. Using the operational planning spatial template, the natural conservation patterning and information programme from the DG of KSDAE (**Table 143**) can be prioritised on high-risk areas with historically high deforestation, high trends in unproductive land area, and vulnerability to fires.

In addition to inventory and protection of BKT areas, the DG of KSDAE also runs a community empowerment programme in protected areas (**Table 143**), which is part of a conservation partnership scheme for the settlement of land that has been controlled and utilised in conservation forest areas (DG of KSDAE Regulation No. 6/2018). In the conservation partnership scheme under the context of community empowerment, conflict resolution is a priority by using a persuasive approach. In addition, land that has been used by the community in the traditional zone is also given access through a Cooperation Agreement (PKS), which is accompanied by an obligation to plant. The conservation partnership scheme in the context of ecosystem restoration is carried out in a rehabilitation zone in the form of utilisation directed at NTFPs.

Table 143. Programmes and activities of the Directorate General of KSDAE related to biodiversity conservation

No	Programme	Activity
1	Species Conservation and Genetics	Area verified for the conservation of plant and animal species and genetic diversity
		Development of biodiversity utilisation entities
		Development of protection entities, and preservation of biodiversity
		Wildlife protection and rescue
		Establishment of species monitoring site
		Control of invasive species to prevent natural ecosystem degradation
		Management of wild plants and animals populations
		Protection of rare/endemic plant biodivesity
		Surveillance of new wildlife-transmitted diseases
2	Management of Essential Ecosystems Conservation	Increasing the effectiveness of KEE management (Wetlands, Biodiversity Park, Karst, Corridors and ABKT)
		Expansion of protected area
		Protection of protected areas, essential ecosystems and protection forests; Conservation FMU (KPHK)
3	Designing and Information on Nature Conservation	Participatory inventory and verification of areas with high diversity values
		Stabilisation (pre-condition)of status and function as well as assessment of the effectiveness of protected areas
4	Protected Area Management	Community empowerment in protected areas
		Managing problems in protected areas (open areas)
		Development of National Parks and Nature Tourism Parks as support for priority tourist destinations
		Development of High Conservation Value Forest (HCVF) and Genetic Resource Areas
		Buffer zone development

By utilising a spatial map of operational planning templates, conservation partnership activities can be directed at areas with KPH categories 1 and 2, where social capital is strong. In areas with strong institutions and weak social capital, conflict resolution is relatively easy. Meanwhile, in areas with weak KPH institutions and high social capital, conflict resolution is not sufficient only in the form of conservation partnerships, but also requires support from the DG of Law Enforcement on Environment and Forestry. Currently, funding support for conservation partnerships is still very limited, especially from philanthropy, with funding contributions from the central government still dominating (70–80%). To increase the source of this type of funding, the use of remediation funds from the RSPO can be directed to conservation partnership activities. Currently, the HGU owner is responsible for spending remediation funds resulting from deforestation after 2008 for rehabilitation activities by third parties. Remediation funding sources from the RSPO can be synergised with ecosystem restoration activities through conservation partnership schemes.

4.3.8.2. Directorate General for Forestry Planning and Environmental Governance (PKTL)

In addition to programmes that are directly related to field activities, BKT area protection also requires supporting activities from the DG of PKTL in the context of forest area determination and completion of forest area boundaries (**Table 144**). Currently, boundary demarcation work has been carried out on 83% of the total area. Based on PP No.23/2021, the determination of forest areas has been included in the National Strategic programme as one of the activities that must be prioritised by the State Budget (APBN). Accelerating the determination of forest areas not only plays an important role in protecting BKT areas but also in reducing deforestation rates and

accelerating the process of resolving conflicts in forest areas that have already experienced overuse.

Table 144. Programmes and activities of the Directorate General of PPTL related to biodiversity conservation

No	Programme	Activity
1	Forest Area Establishment and Management	Determination/consolidation of forest areas, especially in protected areas
		Determination and expansion of forested areas into forest areas
		Forest area planning and establishment
		Forest area boundary management and maintenance

The policy of relocating the State Capital (IKN) to East Kalimantan Province is one of the policies that affect the achievement of Indonesia's FOLU Net Sink 2030 target. The chosen form of the IKN development model will determine the shape of the impact of the IKN policy on achieving FOLU Net Sink 2030. Based on the KLHS, the IKN development model will use the concept of a Forest City. A forest city is a landscape-based city that places forests as the centre of the spatial structure of urban areas and places habitat parks and other natural areas as sub-centres of the spatial structure that is connected to ecological infrastructure. With this concept, the types of economic development activities in the selected IKN candidate areas will be based on efforts to conserve forest areas, develop a carbon economy, and other environmentally friendly economic activities.

The allocation of spatial use will pay close attention to the relationship between blue open space and green open space, community activities based on forestry systems, sustainability of forest environmental services for the lives of city residents and the preservation of nature or the health of its ecosystem, and urban culture or urban activities related to forests (KLHK, 2021a).

With the application of the Forest City concept, the condition of the IKN area will be much greener than the current condition, and thus the development of the new IKN will contribute positively to the achievement of FOLU Net Sink 2030. However, to ensure this condition takes place, it is necessary to affirm the function of each organizational unit under the MoEF and strengthening the functions in conducting environmental safeguards. The strengthening of the functions of the Special Safeguards Management Agency should be observed at all stages of development, starting from planning, construction and post-construction.

The President's assertion that every stage of development has to go hand in hand with the protection of the environment; some of them even undertook restoration and environmental protection efforts before the construction development steps, such as the construction of a large-scale nursery centre with a nursery area of 120 hectares in Mentawir, North Penajam Paser Regency; with a production scale of 15 million seeds per year. At this time the construction of a transitional nursery began; while preparing for the construction of a large-scale KPBU nursery.

CHAPTER V
RULES FOR IMPLEMENTATION AND ORGANIZATION

5.1. Implementation Rules

These are basic guidelines for achieving Indonesia's net sink by 2030 based on the spirit of ambition to achieve maximum reductions in greenhouse gas (GHG) emissions; principles of forest governance, and rational, logical, measurable, and realistic handling.

The spirit of increasing ambition is actualised in efforts and hard work with a maximum target (that is, the achievement of 41% emission reduction rather than only working with a 29% achievement target), which is based on realistic conditions. The ambition to achieve the best possible NDC, which is Indonesia's national responsibility under Act Number 16 of 2016 concerning the Ratification of the Paris Climate Agreement, is the country's basic spirit as it participates in implementing the World Order through global climate change control as an effort to save the earth.

The principle of implementation will be carried out and will take place in a corridor based on the ideal of Pancasila, the constitutional basis of the 1945 Constitution of the Republic of Indonesia, and the operational consensus of the nation's political and applicable laws and regulations. It will also take into account the references and technical guidelines of the UNFCCC.

The substantial technical principles used in the work of Indonesia's FOLU Net Sink 2030 include the following main points; (1) the principle of Sustainable Forest Management; (2) forest and environmental governance; and (3) consistent policy principles and sustainable implementation. As a realistic approach based on science and evidence, Indonesia's FOLU Net Sink 2030 implementation will be carried out in an integrative and collaborative manner and will be adjusted as national and global conditions change.

The IndonesiaFOLU Net Sink 2030 activity requires compound policies (not only one) and policy development innovations in relevant causal relationships. Indonesia's FOLU Net Sink 2030 is the simultaneous work of all elements of government and society that produces good environmental conditions for the community in accordance with the mandate of the 1945 Constitution of the Republic of Indonesia Article 28 H for a good environment for citizens, with readiness to control climate change and its negative impacts that must be reduced.

5.2. Target and Time Period for Implementation of Greenhouse Gas Emission Reduction Actions

The Indonesian government has compiled a mitigation roadmap document as a guide for post-2020 NDC implementation. The roadmap document contains guidelines for stakeholders, including the central government, regional governments, the business world, and the community in efforts to achieve targets.

NDC is comprised of five sectors, one of which is the FOLU sector. Compared to the other four sectors, FOLU not only contributes to emissions but also plays a significant role in GHG absorption. For this reason, the existing mitigation actions in the NDC Road Map need to be sharpened, especially in the FOLU sector, into more operational mitigation actions. The mitigation action activities defined for the Indonesia's FOLU Net Sink 2030

sector consist of five main actions, namely reducing emissions from deforestation and forest degradation, plantation forest development, sustainable forest management, forest and land rehabilitation, and peatland management (see **Figure 18**). Actions to reduce greenhouse gas emissions in the forestry and land sector are carried out from 2021 to 2030, with the main focus being on the period of activity in 2021-2024. Afterward, an evaluation will be carried out every 2 (two) years. Evaluation can also be carried out in the event of significant policy developments and field situations requiring adjustments to targets, steps, policies, work plans, and field situations/site levels.

Besides the focus on the FOLU sector as part of the implementation of the NDC Road Map, an evaluation and review of the NDC were also carried out. Although the current realistic NDC is CM1 NDC, the NDC is often considered less ambitious. Indonesia has also submitted the LTS-LCCR document to the UNFCCC, which provides an overview of Indonesia's ambitions in achieving climate change targets.

The LTS-LCCR document includes the same mitigation actions as the NDC and additional actions to integrate livestock with plantation and forestry lands. Although the action is more or less the same, the target in LTS is more ambitious. The NDC and LTS-LCCR have not accommodated quantitative biodiversity conservation activities, but they are indirectly reflected in natural forest conservation activities—both for areas inside and outside forest areas. By using data and information on the distribution of High Conservation Value (HCV), forest quality, and high ecosystem services, natural forest protection can be directed to areas with a high degree of protection. In addition, various mitigation actions that focus on mangroves, especially those relating to rehabilitation and restoration in mangroves in relation to soil-mangroves, have also not been quantitatively included in the NDC and LTS. Of course, this will be an opportunity to show Indonesia's ambitions in dealing with climate change, for example, in the LCCP scenario.

Table 145. Mitigation action targets of NDC-CM1 dan LTS-LCCP (000 ha)[1]

Mitigation action	NDC CM1			LTS LCCP		
	2013–2020	2021–2024	2025–2030	2013–2020	2021–2024	2025–2030
Reduction in deforestation on mineral land	3,638	1,418	2,136	2,279	675	1,019
Reduction in deforestation on peatland	36	19	20	145	43	65
Reduction in degradation of concession forest[2]	NA	NA	NA	1,320	385	578
PHL[3]	798	1,542	3,058	1,010	1,413	2,207
PBPH-HT[4]	2,560	1,280	1,920	2,560	1,280	1,920
Non-rotational RHL[5]	831	415	623	1,004	502	753
Rotational RHL[5]	1,384	692	1,038	1,115	558	836
Peat water management	713	864	864	624	785	946
Peatland restoration	558	279	419	1,140	579	728
Integration of livestock and plantations and forestry	NA	NA	NA	1,280	580	812

[1]*PHL = Sustainable Forest Management; PBPH = Forest Utilisation Business Permit for plantation forest.*
[2]*In NDC, forest degradation is the total value as a whole, not specific on concession area.*
[3]*In NDC and LTS, PHL activities are translated as increasing secondary forest increments from forest enrichment activities, but logging activities with minimum ecological impact (RIL-C) can also have an effect on increasing secondary increments.*
[4]*The total area of HT on the above table indicatesadditional area. Referencing the NDC mitigation roadmap document, if the existing plantation forest is included, then the total cumulative HT area for NDC-CM1 and LTS-LCCP until 2024 is 9.307 million ha and in 2030 is 11.227 million ha.*
[5]*Referencing the NDC mitigation roadmap document (KLHK, 2019), starting in 2011 the total cumulative non-rotational RHL is 2,076 million ha, while the total cumulative rotational RHL is 3,461 million ha.*

In terms of the intensity of mitigation actions, the LTS-LCCP scenario is indeed set to be more ambitious for actions to reduce deforestation, land rehabilitation without rotation, and peatland management. However, matters related to natural forest conservation, increasing carbon stocks, and carbon storage ecosystems, including mangrove ecosystems,

play an important role in achieving the net sink 2030 target. The clear targets for mitigation actions for NDC-CM1 and LTS-LCCP are as follows (**Table 145**).

5.3. Funding Support

The availability of funding has an important role in the implementation of LTS towards net sinks, especially investment in the FOLU sector, which is a key sector for the success of Indonesia's net zero emission targets by 2060. Funding for activities to reduce greenhouse gas emissions in the forestry and land sector can be financed by the Budget and State Expenditure Revenue (APBN), Provincial/Regency/City Regional Budget and Revenue (APBD), central and regional government partnerships, government and private partnerships, Foreign/Domestic grants, as well as other legal sources of funds and in accordance with statutory regulations current funding.

Funding from the APBN/APBD illustrates the commitment of the central/regional government to climate change mitigation actions, while international funding can be in the form of bilateral or multilateral. Bilateral financing is generally in the form of grants channelled through bilateral or multilateral development agencies, while multilateral financing can be in the form of grants, as well as results-based payments (RBP REDD+)., and other forms of funding.

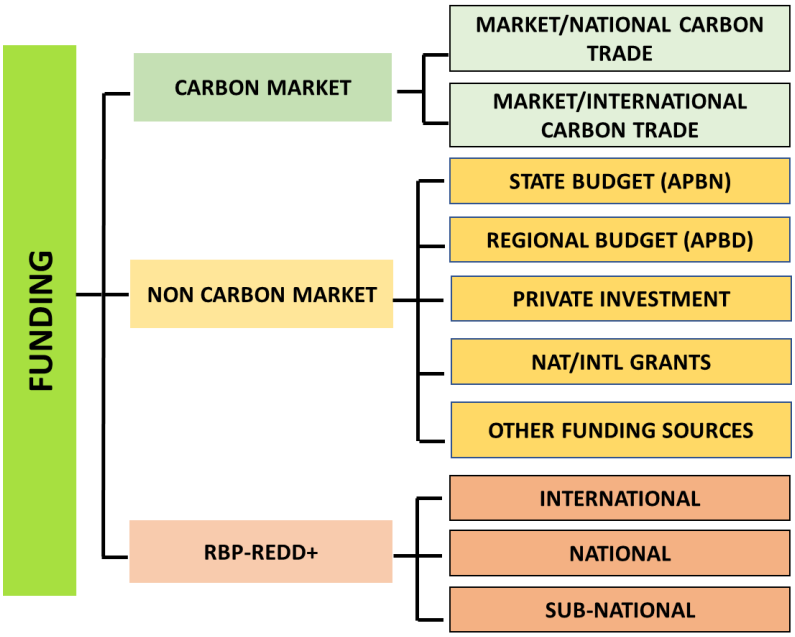


Figure 19. Funding scheme towards FOLU Net Sink 2030

Grants are non-refundable funding, while private equity and debt involve the process of returning funds from forest products, as well as ecosystem services such as ecotourism. Although there is a potential use of funds from the international carbon market for the forestry sector, as stated in Article 6 of the Paris Agreement. This scheme will be discussed further in relation to the accounting framework, to avoid double counting and ensure compliance with additionality (additional emission reductions purely from international support). Furthermore, it is necessary to study the consequences on the sustainability/availability of REDD+ funding in the form of Result Based Payment/RBP

without transferring carbon credits abroad in line with the agreement in the Warsaw Framework on REDD+.

As stated in the LTS-LCCR Indonesia document, the most ambitious scenario of LTS-LCCP is estimated to result in annual growth of national investment of 4.13% with a total investment of 73.3 billion IDR in 2050, followed by an increase in the workforce in green jobs (Republic of Indonesia, 2021). However, if the FOLU sector's commitment to net-sink 2030 is not followed by adequate funding in a short time, mitigation actions can be hampered and increase the risk of the FOLU sector entering a locked-in condition. Meanwhile, this will actually require much larger funding to restore a damaged and severely degraded ecosystem. Indonesia's ambition indicated in the LTS LCCP scenario, will not be possible without the supports of various parties, both national and international (conditional and unconditional situations should not be a limitation).

Using the standard costs of the FOLU mitigation measures listed in the NDC Implementation Roadmap (KLHK, 2019), the total lifecycle cost required for LTS-LCCP mitigation activities towards the net sink for the 2020–2030 period is 204.02 trillion IDR (18.55 trillion IDR per year). The total cost required is still significantly higher than the availability of funds (deficit) calculated from the RPJMN funding tagging process for 2020–2024 mitigation activities, which amounted to 19.61 trillion IDR (3.92 trillion IDR per year; KLHK, 2021). To achieve the most ambitious LCCP scenario, Indonesia explained again that there is a funding gap for the need for mitigation actions of up to 74 trillion IDR (14.8 trillion IDR per year) (**Table 146**).

Table 146. Funding requirement for each mitigation action

Action	Funding requirements (trillion IDR)		
	2020-2024	2025-2030	Total
Deforestation mineral	31.60	36.75	68.36
Deforestation peatland	2.71	5.05	7.75
Degradation mineral	13.07	14.79	27.86
Degradation gambut	1.10	1.24	2.34
HT	34.80	41.76	76.56
PHL	0.88	0.49	1.37
PCK rotation	3.11	3.73	6.84
PCK non rotation	1.47	1.76	3.23
Water system	0.14	0.03	0.17
Peatland restoration	4.76	4.78	9.54
Total	93.63	110.39	204.02
RPJMN	**19.61**	**n.a.**	**n.a.**

As described above, funding comes not only from the government but funding supports and involvement of various parties are very significant. Various scenarios of a combination of funding and policies have also been carried out to obtain optimal results. For example: the funding aspect will not always come from APBN or APBD, therefore, practical steps have also been taken with the support of private funds through KPBU and CSR as well as in-kind contributions, to fulfil the obligations of the holder for the approval of the use of forest areas for mining, such as the rehabilitation of watersheds (DAS).

The forms of financing include, among other things, what has been accomplished so far through collaborative activities between the business world and the community in tree-planting, particularly through schoolchildren and community groups, as well as in tree adoption. Other forms of obligations of the business world are also through the establishment and maintenance of protected areas as well as technical steps to reduce deforestation through reduced impact logging and the development of silviculture sites that will produce endemic hardwood plants.

In the process of developing regulation and recognising the value of carbon economy (with the issuance of Presidential Regulation Number 98 of 2021), the business community and community groups have taken the initiative to carry out tree planting that can be calculated using the Result-Based Payment system and an income distribution system developed by the Ministry of Environment and Forestry under a coaching format and a rule base. Other efforts that are being developed are technical collaborations such as mangrove management and peat management programmes as well as Social Forestry with international funding support, such as the World Bank, Germany, European Union, ASEAN, and others.

In this case, the concept of funding to meet the FOLU Net Sink 2030 target requires an overarching strategy. This starts with increased diversification of sources of financing and an increase in the capacity of financial institutions to an increase in the capacity of stakeholders to access financing. The Government of Indonesia has developed a funding system and mechanism to support the implementation of climate change mitigation and adaptation actions, as shown in **Figure 20.**

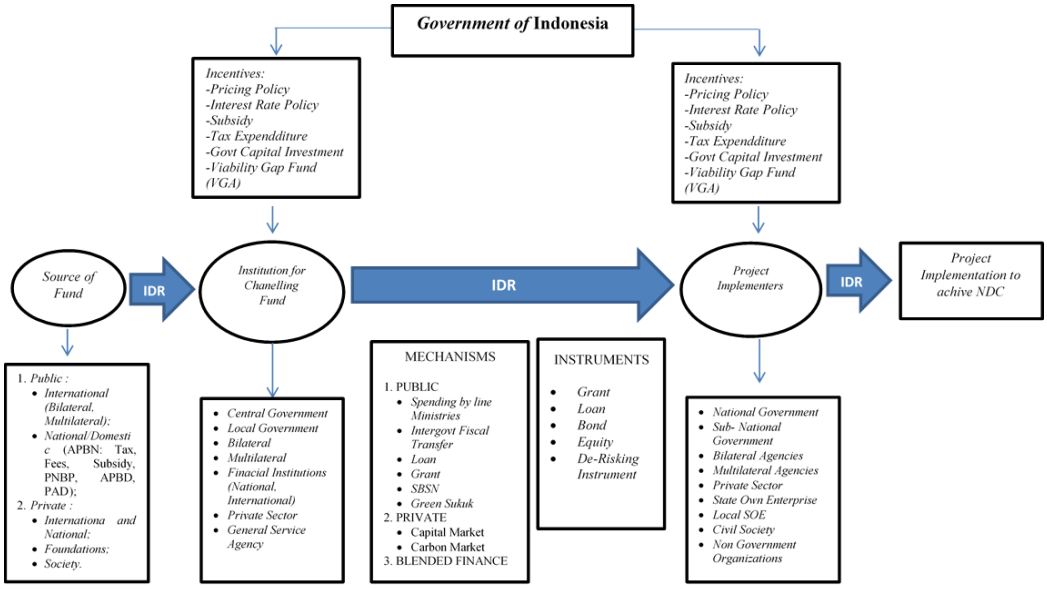


Figure 20. Funding system to support the implementation of climate change mitigation action (Ministry of Forestry and Environment 2019)

The identification of funding sources for the implementation of forestry sector mitigation actions for the 2021–2030 period results in an estimated funding allocation of 45% of the government and 55% by the private sector (KLHK 2021). Distributed government funding sources will come from leveraging funding at the central level (APBN) through: a) green sukuk instruments and the domestic carbon market (Carbon Economic Value), b) ecologically based budget transfers; c) optimisation of funding at regional level through the instrument of Regional Government Revenue (PAD) and regional green bonds, and d) optimisation of the Result-Based Payment scheme for REDD+. In the meantime, private sources will be directed to grant instruments, green bonds, loans, private equity, Corporate Social Responsibility (CSR), etc.

For optimisation of central and regional funding (APBN and APBD), potential funding opportunities are green sukuk/green bonds, NEK, and intergovernmental fiscal transfers. The Indonesian government has a good track record of attracting investment of 1.25 billion USD through the green sukuk/green bond scheme in 2018. Despite that the green bond market has developed rapidly at the international level, the implementation of the green

bond market in developing countries still requires an early stage evaluation of the technical implementation process (definition of asset classes, setting standards, structuring transactions, and attracting investors). In addition to green bonds, intergovernmental fiscal transfer instruments are modified using ecological parameters.

The Indonesian government is currently in the stage of developing the domestic carbon market, which will be directed through levy and tax schemes and the mechanism regulated in Presidential Regulation Number 98 of 2021 concerning the Economic Value of Carbon (NEK). The NEK mechanism and transparency framework are shown in **Figure 21** and **Figure 22**.

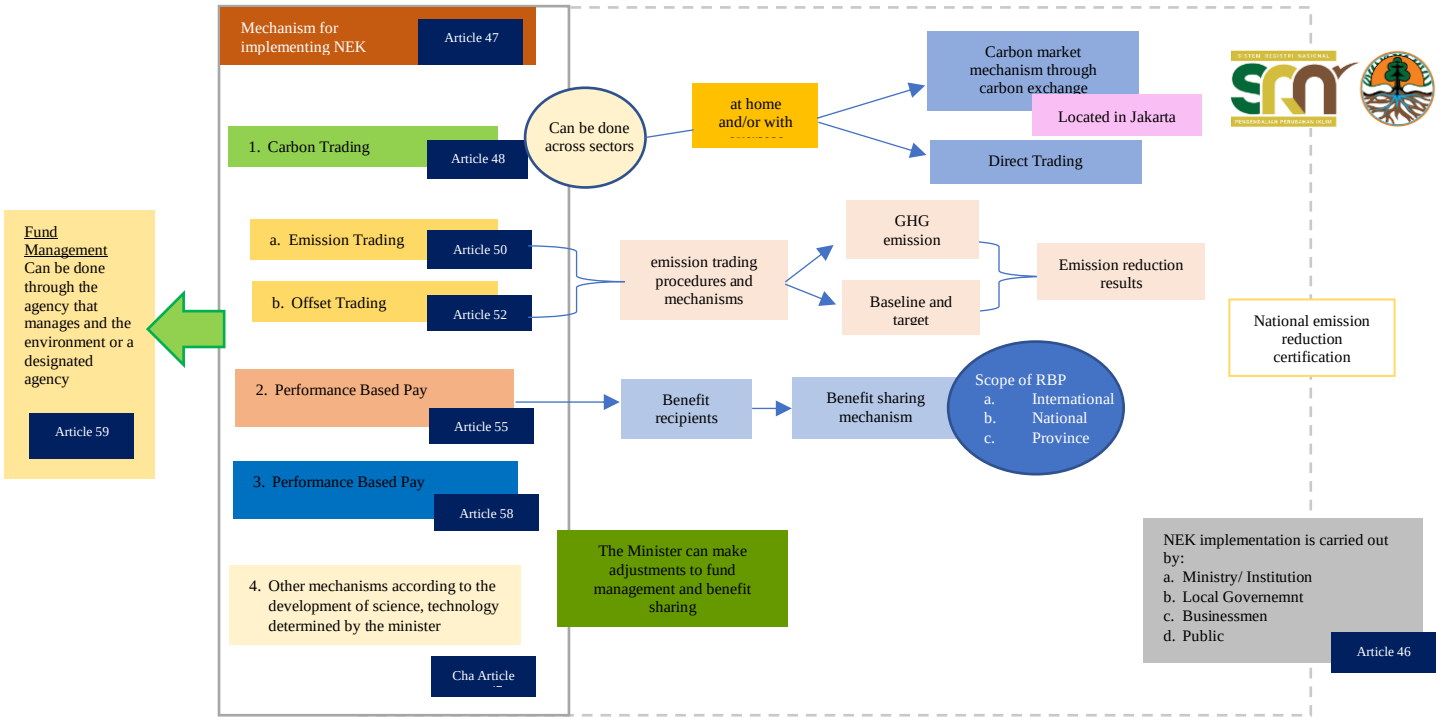


Figure 21. The NEK instrument implementation governance

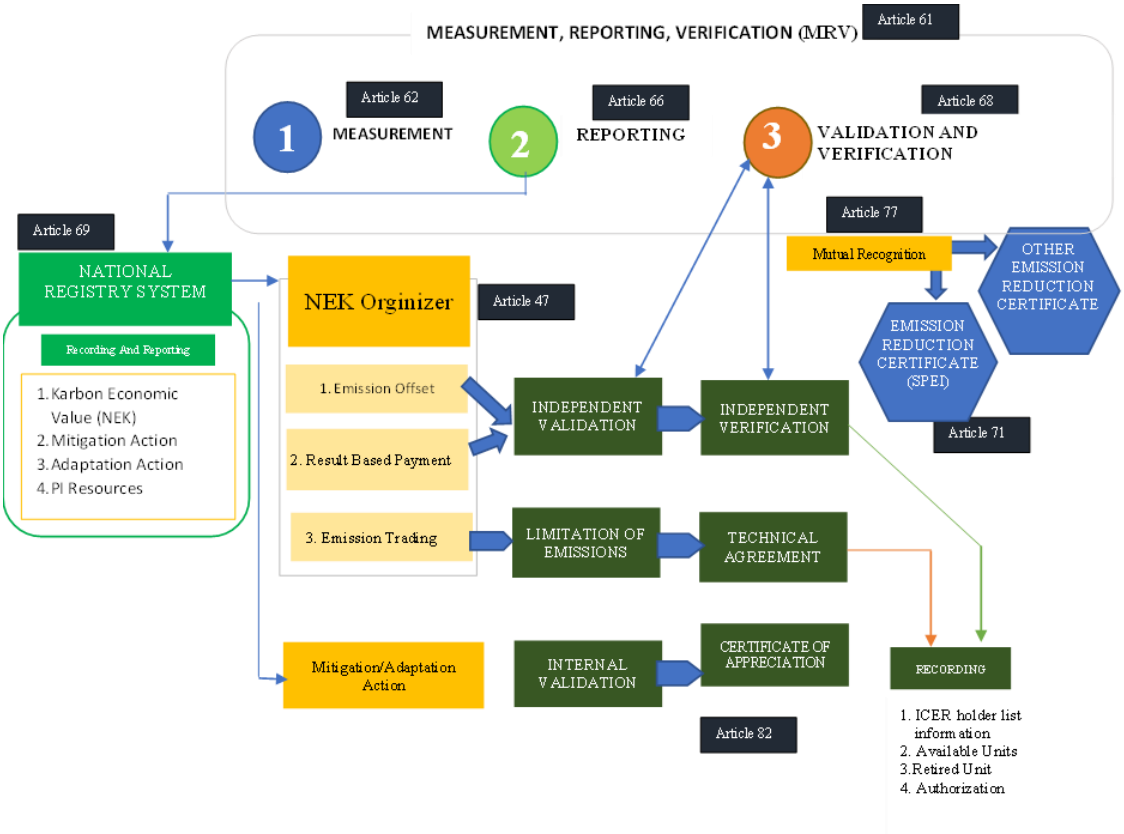


Figure 22. Transparency framework in NEK implementation

Compared to funding sources from the government, private financing for mitigation actions in the forestry sector is still very minimal and is dominated by commercial activities and forestry products. However, the lack of private contributions may also be caused by the unintegrated system for collecting data on private sector financing. Although there are many potential schemes that can be used to engage the private sector (equity, private debt, CSR, green bonds, insurance, microcredit, etc.), the low participation from the private sector is predicted due to the high investment risk. An option that can be done is to consider a guarantee scheme whose function is to bear the risk sharing in order to encourage private investment related to climate change in the forestry sector.

Funding through the Environmental Fund Management Agency (BPDLH) is also a potential funding alternative, given the potential for BPDLH support in efforts to build the environment through scheme, such as small grants, investment, and capacity building for the community and for government officials. At this time, BPDLH has completed the stages for determining the funding channelling institution.

In addition to the sources of private and government financing that have been described, exploration of other potential sources must also be carried out, for example, Payment for Ecosystem Services (PES), which has been widely studied in various studies. Protection of ecosystems with important regulatory services (supported by policies from the central and local governments) can be used as the basis for determining payments from PES schemes. To identify other funding sources, it is necessary to conduct a feasibility analysis related to the potential for funding and the availability of funds that will be closely related to the potential for programme sustainability.

5.4. Monitoring, Evaluation dan Reporting

In general, there are 2 reporting mechanisms related to Indonesia's FOLU Net Sink 2030, namely 1) Reporting on the implementation of mitigation actions and 2) Reporting on annual GHG emission levels (GHG emission inventory). Mitigation implementation reports are carried out for; a) monitoring the implementation of all work elements in the framework of Indonesia's FOLU Net Sink 2030; and b) obtaining regular information in order to know and understand the factual conditions, constraints, obstacles, and the development of mitigation actions in the context of reducing greenhouse gas emissions as planned.

Monitoring the implementation of mitigation actions is carried out to identify the source of obstacles or problems as soon as possible; divide work progress at each stage of work according to the plan; build follow-up efforts and things that need to be developed further, and to get new inspiration and innovations. In addition, it also encourages leading activities that have a significant impact on reducing GHG emissions. In regular evaluation, reporting on the implementation of mitigation actions needs to be accompanied by field documentation (photos, videos, or information from drones) per activity stage containing data on time and geographic location. Reporting on the implementation of mitigation actions or reporting on technical work for Indonesia's FOLU Net Sink 2030 is carried out through several stages as follows:

a) Preparatory meetings are held to discuss, determine, and agree on the criteria and indicators to be used;

b) Implementation, which includes recording and data collection is carried out by the technically responsible work unit together with the work unit responsible for the evaluation and reporting of the related Work Unit activities;

c) Recapitulation of the report on the implementation of the mitigation action is carried out by the evaluation and reporting unit at the relevant stake. This is to ensure that all implementation of mitigation actions are carried out according to the plan with the budget that has been set;

d) Evaluation (valuing), which is carried out periodically by providing an assessment of the success of the achievement of activity targets (outputs) and impacts (outcomes);

e) The evaluation results are submitted to the Directorate General of Climate Change Control, Directorate of Greenhouse Gas Inventory, and Directorate of Climate Change Mitigation. As part of the annual IGRK reporting, this is intended to provide information concerning whether or not there is a need to boost or prioritise the implementation of mitigation actions carried out in the following year by considering the achievement of GHG emission reduction targets towards the Indonesia's FOLU Net Sink 2030;

f) Monitoring of mitigation actions in the FOLU sector will be strengthened with Norms, Standards, Procedures, and Indicators (NSPK) for controlling, monitoring, evaluating, and reporting on the implementation of mitigation actions for reducing emissions from the forestry and land sector (FOLU).

g) Reporting is carried out in stages to the Minister by the Governor.

The annual GHG emission level reporting (GHG emission inventory) will be carried out by following the established forest and land sector MRV (Measuring-Reporting and Verification) rules. Some of the important points for reporting GHG emission levels are as follows:

a) Annual and overall GHG reporting is carried out as a result of all Indonesia's FOLU Net Sink 2030 activities in that year;

b) In regard to the monitoring and evaluating of the annual GHG emission level report, the periodic evaluation will be conducted in three phases: Phase I in 2024, Phase II in 2027, and Phase III in 2030.

c) Evaluation of annual GHG reporting can also be carried out incidentally based on the needs and developments of the situation, including urgent conditions and/or according to needs.

d) Annual GHG reporting will use Activity Data (DA) and Emission Factors (FE) built into the National Forest Monitoring System (NFMS), as well as other information data in accordance with IPCC provisions. The use of this NFMS is in accordance with PP Number 23 of 2021 concerning Forestry Implementation. For this reason, strengthening the NFMS becomes very important to ensure the supply of data as well as ensuring the quality of adequate information data for the needs of annual GHG reporting.

e) Strengthening of NFMS to support annual IGRK reporting also includes strengthening of the KLHK Geospatial Information Network (JIG), which is the mandate of PP No. 23 of 2021 on Forestry Implementation, and is also integrated with the implementation of National GIs (mandate of Government Regulation No. 45 of 2021 on Implementation of GIs).

Reports on technical work on mitigation actions as well as progress reports on targets that have been planned are carried out by implementing mitigation actions through the National Registry System (SRN). The assessment of GHG emission reduction is carried out by the Monitoring, Reporting, and Verification (MRV) Team for all activities performed using the FOLU Net Sink target reference by 2030 (net-zero emission). Reporting on emission reductions at the Sub-National level is carried out by the Governor and the Office in charge of forestry and environmental affairs. The report at the Sub-National level is in the form of a report on the implementation of mitigation actions carried out in its area, as well as a report on the GHG emission reduction achieved.

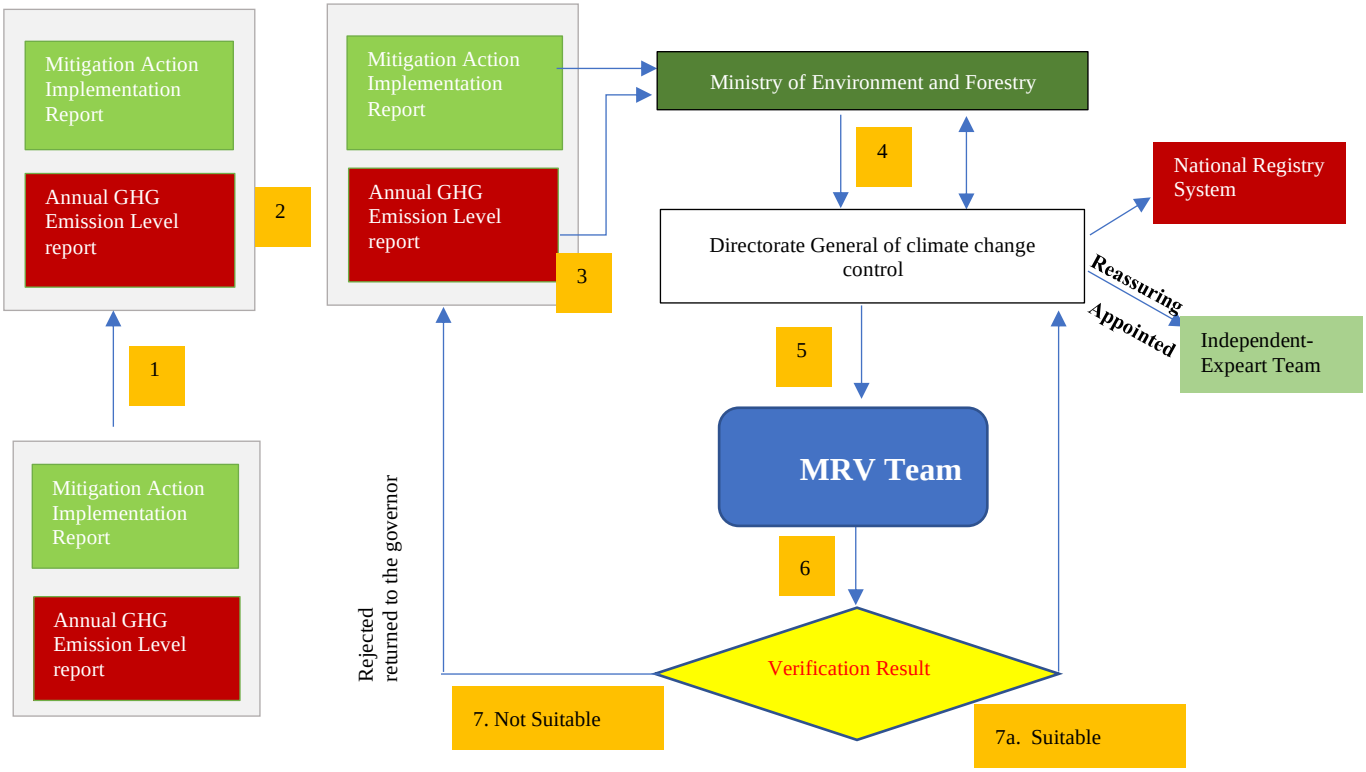


Figure 23. Flow mechanism of reporting and verification of greenhouse gas emission reduction

Reports on the results of reducing greenhouse gas emissions are determined by the work unit and recorded in the National Registry System (SRN) managed by the Directorate General of PPI. A report on GHG emission reductions could include the achievement of GHG emission reductions resulting from the activities of Indonesia's FOLU Net Sink 2030. The data used for calculating GHG emissions/absorption are carbon stock data used in the National GHG inventory and existing land cover data in the National Forest Monitoring System (NFMS). The flow of the GHG emission reduction reporting mechanism is shown in **Figure 23**.

5.5. Work Organizing

Organizing the implementation of the FOLU Net Sink 2030 operational plan is oriented towards achieving the Nationally Determined Contributions (NDC) target. The forestry sector and land use contribute 17% (seventeen percent) of the 29% (twenty-nine percent) emission reduction target of all sectors in the CM1 scenario, or 24% (twenty-four percent) of the 41% (forty-one percent) emission reduction target of all sectors in the CM2 scenario.

The achievement of the NDC target is supported by controlling Greenhouse Gas (GHG) emissions in the forestry sector to become a store, or strengthening of carbon with a carbon net sink approach from the forestry sector and other land uses by 2030 (Indonesia Forest and Other Land Use Net Sink 2030), as regulated in Presidential Regulation Number 98 of 2021 concerning Implementation of Carbon Economic Values for Achieving Nationally Determined Contribution Targets and Control of Greenhouse Gas Emissions in National Development.

Several practical activities in organizing work in accordance with the MoEF structural task activites, and in daily work, covering aspects (digit-1), namely :

1) Forest and Land Fires;
2) Forest and Land Rehabilitation;
3) Sustainable Forest Management;
4) Social Forestry;
5) Management of Protected Areas and Consolidation Efforts of the of Wildlife Habitats Fragmentation;
6) Protection and Management of Peat Ecosystems;
7) Development of Green Open Space and Environmental Recovery (Afforestation) and Ecoriparian.

Furthermore, the activities could be identified which included in technical activities (digit-2) consist of :

SUSTAINABLE MANAGEMENT OF PRODUCTION FOREST

1) Intensive silviculture;
2) Reduced Impact logging;
3) Multi forestry business;
4) Rotational RHL;
5) Development of energy plantation forest;
6) Environmental recovery, ecosystem restoration, ecosystem replication and ecoriparian;
7) Implementation of timber legality verification system.

FOREST AND LAND FIRE CONTROL

1) Biogeophysical control of forest and land fires;
2) Mitigation and adaptatioin of forest and land fires;
3) Licensing control system an law enforcement;
4) Preparation of zero burning land clearing;
5) Fostering of traditional agriculture, shifting cultivation;
6) Work optimisation of Manggala Agni;
7) Legal awareness (paralegal);
8) Law enforcement.

FOREST AND LAND REHABILITATION (RHL)

1) Rehabilitation of Protected Functions of Forest Areas;
2) Community Empowerment in RHL;
3) RHL for water, food and energy sources;
4) RHL on peatland and mineral lands;
5) RHL mangrove;
6) RHL community participatory;
7) RHL rotational and non-rotational schemes;
8) RHL with productive plants;
9) RHL restoration of natural disaster areas;

10) RHL Ex-mining and licensing control;
11) RHL Proklim pattern;
12) RHL and the role of the younger generation and local champion;
13) Evaluation system of RHL (instruments).

SOCIAL FORESTRY

1) Village forest development;
2) Community forest development;
3) Community plantation forests development;
4) Customary forests development;
5) Forestry partnership and offtaker system;
6) Facilitation of business opportunities and social forest financing;
7) Synchronization of RHL and social forest activities;
8) Plantation forest in social forest area;
9) Social forestry business development, off taker, cooperation and training;
10) Social forestry and peat ecosystem restoration;
11) Social forestry for food security, water resources and energy;
12) Facilitation of establishment of indigenous people and customary forest
13) Instruments for measuring the performance and success of social forestry.

AREA CONSERVATION AND BIODIVERSITY

1) Development of HCVF;
2) Development of wildlife corridor;
3) Management and restoration of essential ecosystem;
4) Biodiversity evaluation;
5) Conservation of wild plants and animals;
6) Conservation of mangrove and coastal ecosystem;
7) .Control of illegal wildlife trade;
8) Management of Conservation Institution (LK);
9) Establishment of Botanical Garden and ex-situ conservation area;
10) Establishment of Grand Nature Parks and Nature Recreation Parks;
11) Utilisation of protected area environmental services;
12) Development of conservation partnership;
13) Engagement of community and application of local wisdom.

GOVERNANCE : SISTEM, METODE DAN FAKTOR PENDUKUNG
GOVERNANCE : SYSTEM, METHODS AND SUPPORTING FACTORS

1) Permanent Policy on Moratorium and Suspension of Permits and Management of Primary Forests and Peatland (PIPPIB);
2) Forest area management policy (development, community, business, settlement);
3) Establishment of state forest areas;
4) Development and actualisation of kph institutions;
5) Improvement of peatland management;
6) Improvement of mangrove governance (mangrove governance);
7) Methods for calculating deforestation and forest degradation;
8) Monitoring of deforestation and forest degradation;

9) Reporting on deforestation and forest degradation;
10) Verification of deforestation and forest degradation;
11) Reward and punishment system for deforestation and forest degradation;
12) Controlling deforestation through social forestry programmes and law enforcement;
13) Law enforcement and the imposition of administrative, civil and criminal witnesses;
14) National development coherence and deforestation control (klhs instrument and others).

As an effort to realise FOLU Net Sink 2030, a team is required to handle the workload of controlling deforestation and forest degradation, which includes the following elements: Sustainable Forest Management; Increase in Carbon Stocks; Enhancement of Biodiversity Conservation; Peatland Ecosystem Protection and Management, and NDC Information and Policies.

The team is primarily tasked with coordinating and integrating the implementation of FOLU Net Sink 2030 from each element of the Ministry of Environment and Forestry (and all related elements in the Regional Government or the community). The Working Team is facilitated for consolidation purposes in the form of the FOLU Net Sink 2030 Project Management Office (PMO). The FOLU Net Sink 2030 Working Team is an integral part of the KLHK Climate Change and Carbon Economy Control Working Team (**Figure 24**) and the organizational scheme of the FOLU Working Team Net Sink 2030, as shown in **Figure 25**.

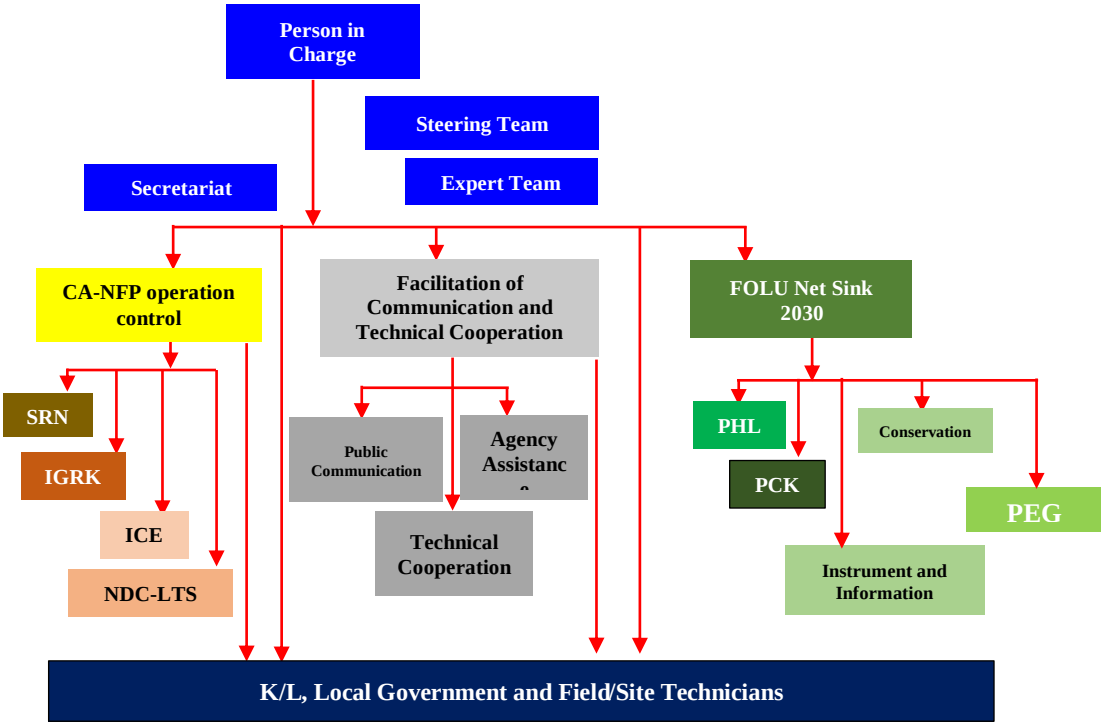


Figure 24. FOLU Net Sink 2030 organization within the framework of Climate Action NFP-Indonesia

What is needed from the leadership of MoEF bureaucracy for the success of Indonesia's FOLU Net Sink 2030 is an understanding of the subject position of the FOLU Net Sink 2030 as summarized in this Operational Plan (RENOP) which need to implemented with an optimictic, innovative, strategic, tactical spirit, administrative completeness, and

adequate participation and also information public. Each component (Work Unit) understands the position of the task as well as the method to be achieved and the approach in this RENOP to be managed in working with the target group.

For FOLU Net Sink 2030 to succeed, KLHK bureaucratic leadership must grasp the global subject as outlined in this Operational Plan (RENOP). This operational plan must be implemented in a strategic, tactical, administratively complete, and public-facing manner with optimism and diligence. Each component of RENOP (Work Unit) understands the position and task, the method to be achieved, and the approach to be taken in working with the target group.

With respect to the target of each KLHK component, it is necessary to continue to build and consistently maintain the Participation of the Target Group (grassroots managements) in various forms of working with the community. As a result, basic mastery (science and evidence-based), inventory skill, and database (data, information, films, exposure frequency), along with relevant strategic environmental analysis will become more important as times change. It is imperative to maintain an understanding of the work instruments and to follow and update them in terms of policies, programmes, priorities, authorities, budgets, personnel, assets, databases, information, supervision, and publicity/social media. Meanwhile, networking (politics and grass root) and technology are also not less important.

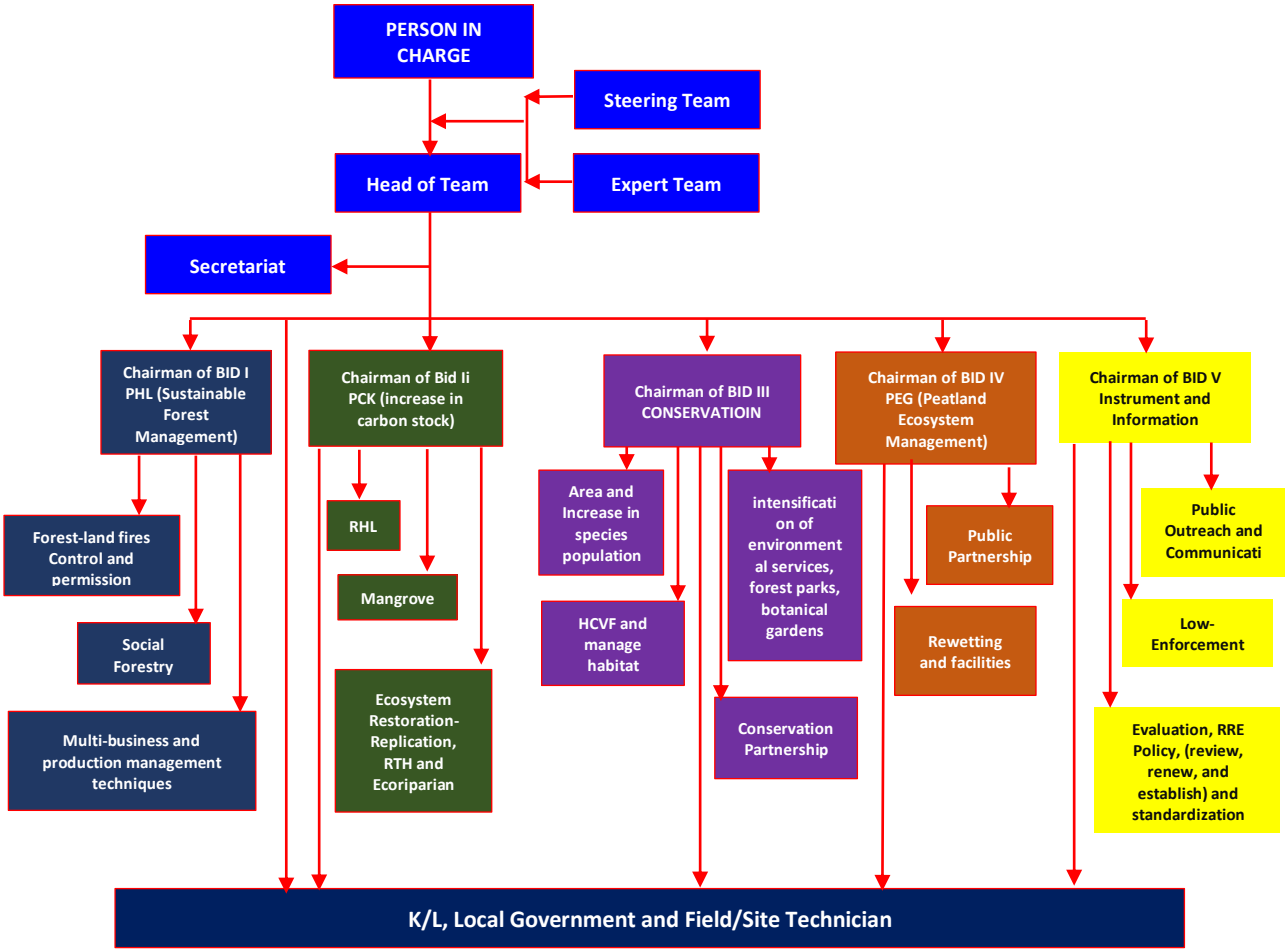


Figure 25. FOLU Net Sink 2030 working unit organization scheme

5.6. *Disclaimer*

This Operational Plan is an effort and a step by the Government of Indonesia to achieve carbon-neutrality in the forestry sector, which is identical to the net zero emission of the Indonesia's FOLU Net Sink 2030 Programme, through the LCCP scenario. In its implementation, it is carried out through the LCCP scenario as stated in the ambitious step to achieve net-zero emissions in the FOLU sector by 2030. In this regard, we continue to consider the dynamics that develop in the course of carrying out work assignments, policy developments, and global, national and local references that require safeguarding in the form of implementation on a minimum target according to the CPOS (current policies) or NDC scenario.

Work dynamics related to geospatial data/information, namely the KLHK IGT for the 2018–2019 update period, are sourced from the KLHK geospatial database. This spatial study is part of the results of a review of spatial-based programme integration activities at the site level at the Ministry of Environment and Forestry in 2020.

It is important to emphasise this disclaimer with these conditions, namely:

The first disclaimer: to provide safeguards so that if we cannot achieve the LCCP scenario (because of conditional and unconditional), Indonesia will remain consistent and in accordance with its legally binding commitments (namely NDC), but will still show its ambition to use the LCCP scenario.

The second disclaimer: to provide an illustration that if there is still a discrepancy in the field regarding the numbers, it needs to be seen and considered as reasonable with the conditions for the difference in the data periods used.

The third disclaimer: there are cross-sectoral issues that will affect the achievement of Indonesia's FOLU Net Sink 2030 target including, among others, the emission reduction target in the FOLU sector and land requirements between biomass energy development, food security and emission reduction targets in the FOLU sector.

The fourth disclaimer differences can result from analysis and field work (although some are not in principle/not significant) due to the use of different map scales (level of intensity of the map) mainly associated with RHL activities. In this regard, coherence steps will continue to be taken.

The fifth disclaimer: on the other hand, in the initial activities to unite or integrate the businesses of many work units (and do not rule out the possibility between regions), there can also be a perception bias on the methodology, such as in the assumption of NDC and LTS survival rates 23 % of the actual area is 23%, compared to the success requirement (affirmed by the percentage of growing plants), which is 75% as stipulated in the MoEF Regulation Number 23 of 2021 concerning the Implementation of Forest and Land Rehabilitation. In such case, while the activities are ongoing, there will be a coherence of views, methodologies and results.

The sixth disclaimer: although it is unlikely that this will happen, with changes in policies and work procedures to be more effective in bringing about the actualisation of the principles of Sustainable Forest Management, Forest Governance and Carbon Governance, there is still the possibility of institutional problems, in terms of activities and elements of work implementation, especially in areas that are very likely to include several institutional forms with a rule base that will be continue to be aligned (learning by doing).

The seventh disclaimer: at the national level, matters related to the NDC achievement approach and the low carbon development approach (which includes the FOLU sector)

must be adjusted to the NDC approach as mandated by Act No. 16 of 2016 concerning the Ratification of the Paris Agreement.

5.7. Closing

The Indonesia's FOLU Net Sink 2030 Operational Plan is a necessity in gathering the existing dynamics, including the dynamics of policy developments and the dynamics of field implementation, in the form of regional variations and conditions at each implementation locus. Afterwards, these policy developments must be practically tested and continuously improved until a format appropriate policy or implementation as well as approaches and considerations of causality between events including between policies and their implementation in the field. This Operational Plan is expected to provide a way to collect all thoughts, ideas, work methods, including field work as well as things that must be adopted from various ecosystem characteristics that vary very high throughout Indonesia..

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