# Draft National Strategy on Enhancing and Maintaining Forest Carbon Stock through Sustainable Forest Management Activities: A Strategic Assessment

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*Enhancing Forest Carbon Stock to Reduce Emission from Deforestation and Degradation through Sustainable Forest Management (SFM) Initiatives in Indonesia*

# FOREWORD

Manuscript on assessment of improved and maintenance of forest carbon stocks through Sustainable Management of Forest (SMF) in Indonesia also implies an effort to decrease greenhouse gas (GHG) emissions of the main elements, namely carbon dioxide ($CO_2$), methane ($CH_4$), di-nitro-oxide ($N_2O$) , hydro-fluorocarbons (HFCs), perfluorocarbons (PFCs) and sulfur hexafluoride ($SF_6$). Carbon dioxide is the most dominant GHG in the atmosphere (over 75%), therefore all calculation of GHG emissions of these gases are comparative to this gas. In this discussion, the sustainable use of forest (PHL) is within the context of Sustainable Management of Forest (SMF). Included within SMF are actions that reduce emissions from deforestation (forest conversion) and degradation (sustainable forest management practices), the role of conservation (through avoided emissions / conservation of forest carbon stocks), increases in carbon stocks (through reforestation, and restoration of ecosystems), and regeneration and rehabilitation of land / forest (through reforestation and afforestation on degraded forest).

GHG emission reduction efforts in sustainable forest management can be done with a variety of measures which include the eradication of illegal logging and illegal mining, prevention of encroachment and forest fire, reduction in allowable cut, and prevent the conversion of forests (forest release) that alter the function and the allotment of forest.

The actions that can increase carbon stocks can be done through climate change mitigation measures in the form of planting and maintenance of forest carbon. Forest as a collection of trees and other vegetation is able to absorb carbon through photosynthesis and store carbon in tree roots, litter and in soil. Various schemes to mitigate climate change has been established, among others, Reducing Emissions from Deforestation and Degradation Plus (REDD +) which may include the prevention of emission of action forest conversion, the role of conservation in storing carbon, sustainable management of forests (Sustainable Forest Management, SFM), and enhancing carbon stock.

All of the role and coverage of REDD + directed an effort to sustainable management in forests (Sustainable Management of Forest, SMF). In addition to the scheme, Aforestation and Reforestation within the Clean Development Mechanism (A / R CDM), Voluntary Carbon Market (VCM) through a cap-and-trade (carbon offsets), Upstream and Downstream Incentive (UDI), and Department of Natural Swap (DNS). This is discussed in the text around the understanding that sustainable forest management in its ability to improve and maintain forest carbon, not only according to the understanding of SFM alone.

The main reference in the writing of this manuscript is a National REDD Strategy, National Action Plan for Reducing Emissions of greenhouse gases (GHGs RAN), and the writing of a national consultant-RED ITTO PD 007/09 Rev. 2 (F), as well as various studies related to climate change mitigation from various national and international journals. Discussion of the manuscript was facilitated by ITTO PD-RED 007/09 Rev. 2 (F) through the Forum Group Discussion (FGD) with a multi-stakeholder (government agencies within the scope of forestry, the association / private holders of Timber Utilization Permit (IUPHHK), Non Governmental

Organizations (NGOs), and Lambung- Mangkurat (UNLAM). Other Reference document is the National Forestry Plan (RKTN) which has given the directives on area according to its function, which has been determined by the Minister of Forestry Indonesia. The focused discussions were carried out five times (December 28, 2011, January 31, 2012, February 15, 2012, February 29, 2012 and March 14, 2012) so that all inputs can be useful to improve the writing of this manuscript.

To Dr. Bambang Widyantoro who has worked hard to write and compile this review, we give our thanks and highest appreciation. In addition, to all participants of the discussion we also say the same thing for the inputs provided to complete the writing and at the same time improve this document as well. In addition, we thank the ITTO Project PD-RED 007/09 Rev. 2 (F) which has facilitated the preparation of this study. In particular, thanks are also directed to Dr. Ir. Yetti Rusli, MSc. and Prof. Dr. Ir. Rizaldi Boer, MSc., mainly on the substance of the text related to climate change mitigation in the forestry sector, as well as to Dr. Ir. Sunaryo, MSc., as a facilitator in the implementation of FGD that occurred 5 times with various government institutions and non-governmental organizations within the scope of forestry and / or associated with the substantial context.

Hopefully this can provide valuable input to complement the National Strategy on REDD + and RAN-GHG, particularly in sustainable management in forests (SMF) including SFM (Sustainable Forest Management) in Indonesia.

Jakarta, April 10, 2012
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# EXECUTIVE SUMMARY

The purpose of this study was to determine the right strategy in an increase in carbon stocks through climate change mitigation scheme to achieve emission reduction targets of forestry in Greenhouse Gas (GHG) emissions by 14% from 26% national target unilaterally (without foreign aid). Agreed vision is "Creating a Sustainable Forest Management Certified to Support Indonesia and Climate Change Mitigation and Equitable Community Welfare". Mission to achieve that vision should be achieved by 2020 through the sustainable management of Indonesia's forests are as follows: (1) improve the management of Indonesia's forests and to require the entire forest in Indonesia to certify forest, (2) reduce greenhouse gas emissions, improve and maintain forest carbon stocks in a variety of schemes in climate change mitigation, (3) develop financial incentives that are packaged in a specific funding framework to decrease, increase and maintain forest carbon stocks, and (4) improve the welfare of communities in and around the forest through variety of income earned from actions intended to reduce emissions, improve, and maintain forest carbon.

Assessment methodology uses SWOT analysis and equipped with a PEST (Policy, Economic, Social and Technology) as well as international legalization. REDD plus strategies in forest management practices through sustainable production in Indonesia should have the capability of international competitiveness. This study has been carried out through discussions with parties through the FGD five times with various stakeholders (government institutions and non-governmental organizations, including universities), as well as referring to the writings of REDD plus, A / R CDM and VCM associated with sustainable production forest management.

Main problems in the Sustainable Forest Management (SFM) are related to efforts to reduce GHG emissions, increase and maintenance of carbon stocks which include (1) high opportunity cost to maintain production forests, (2) uncertainty of working area of managed forests, (3) inconsistency of forestry policies and regulations, (4) inefficiency in utilization of timber production, and (5) failure to detect and suppress forest fires in production forest. In addition, procedures for obtaining government approval, ownership and distribution of carbon benefits, limited market access, as well as unclear market demand. Also, local governments are unprepared and institutionally weak in accommodating various opportunities for climate change mitigation funding schemes.

Weakness which is owned by forest managers associated with climate change mitigation in Indonesia related to the improvement and maintenance of forest carbon stocks, among others are among others: (1) have not understood some of the schemes climate change mitigation, both technical and funding incentives, (2) the cost of forest improvement toward certification is still too expensive for most forest managers of production forest, (3) less than optimal results from environmentally friendly logging practices (Reduced Impact Logging, 'RIL'), (4) weak law enforcement for forest managers who do not obey forestry and environment laws and regulations; and (5) lack of incentives for sustainable forest managers.

This study shows an increase of total forest carbon uptake in the entire forest area from 2000 to 2006 with an average rate of 3:14%, whereas from 2006 to 2009 there is quite drastic decrease of about 11.68% per year. Especially in large-scale forest enterprises, carbon uptake increased from the year 2003 - 2006 with the average rate per year of 3:29%, whereas in the year 2006 to 2009 declined by 11:35% per year. For small-scale forestry enterprise, the rate of increase in uptake is about 3:34% per year in the years 2003 to 2006, whereas between the years 2006 to 2009 there is a decline in forest carbon uptake in the small-scale forest enterprise of about 10:30% per year.

For non-forest area, increased in forest carbon uptake between 2003 - 2006 is around 2.12%, whereas in the years 2006 to 2009 there is a decline in forest carbon uptake of about 10.96%. In line with the increase / decrease in forest carbon stocks on the non-forest area, forest carbon uptake decreased between year 2006 - 2009 as a result of slower rate of planting in this region than the rate of forest conversion to plantations or use of land for other purposes.

In year 2009 Indonesia is a net emitter of 108.24 million tons of $CO_2e$. This indicates that outside the forest area opening has occurred in the still existing vegetation cover (secondary 'mire forest', or shrubs), both for plantations, mining, or other land-based activities. When compared to a net sink in the area between the forest and outside forest areas, the net sink in forests is on the average 22% higher than outside the forest area. This proves that the function of forests to absorb carbon is higher than the non-forest.

This study refers to the directives on forest areas for specific functions under the Ministry of Forestry which are forest area for conservation, protection of natural forests and peat lands, rehabilitation of land / forests, large and small scale forestry enterprises, as well as non-forest areas. A review of studies on forest carbon enhancement and maintenance with base-year 2009 in the area for the purpose of conservation, protection of natural forests and peat lands, large and small scale forestry enterprises, as well as non-forest areas are summarized below.

Enhancement of forest carbon stocks in 2020 and cumulative year 2010 - 2020 in accordance with forest area uses

Tabel 6. Perubahan Stok Karbon Tahun 2010 – 2020 melalui Pengelolaan yang lestari Hutan Indonesia

| No | Tindakan | Base year 2009 | Peningkatan 2010 – 2020 | Stok Karbon 2020 |
|---|---|---|---|---|
| | | ---------- Juta t.$CO_2e$ ---------- | | |
| 1 | Konservasi | 3.645,10 | 152,61 | 3.797,71 |
| 2 | Perlindungan HA dan lahan gambut | 5.596,43 | 257,84 | 5.854,27 |
| 3 | Rehabilitasi lahan/htn | 498,68 | 439,46 | 938,14 |
| 4 | Pengusahaan hutan skala besar | 9.034,03 | 841,82 | 10.783,84 |
| 5 | Pengusahaan hutan skala kecil | 503,56 | 378,92 | 882.48 |
| 6 | Non-kehutanan | 6.156,84 | 560,03 | 6.716,83 |

Strategy on improvement and maintenance of forest carbon stocks that were developed after a SWOT analysis can be summarized below:

The management areas for conservation with good performance is (1) prefer an compulsory carbon market, in a cap-and-trade in REDD + and UDI which has a value of compensation or payment of a higher performance than the voluntary market (pattern PES). Then, it will also (2) direct it for the purpose of eco-tourism, where research, with biodiversity bank HCVF as priority, and utilization of non-timber forest products, (3) to protect and maintain carbon stocks in this region (funds from national budget / regional budget), and setting up this area as a conservation area to get UDI compensation schemes, (4) prevent the region from deforestation and forest degradation by maintaining the area from the Provincial Spatial revisions to get compensation (PDR pattern). Furthermore, (5) establish an integrated innovation development programs that increase the income of the people of this region through cross-sector partnership program;

The management area for conservation with poor performance include (1) prefer a close carbon market with CSR funds both nationally and internationally, or other public funds according to the REDD + and UDI (PES pattern), (2) rehabilitating critical forest and utmost priority and priority watershed area to make use of funding incentive from the A / R CDM and / or VCM. Then, (3) to protect and maintain carbon stocks in this region (funding from national and regional state budget), and by setting some of these areas as conservation areas for UDI compensation schemes. Furthermore, (4) prevents most of this region from deforestation and forest degradation by maintaining the area from the Provincial Spatial revisions to get compensation (PDR pattern), and (5) establish an integrated innovation development programs that increase people's income through cross-program partnerships sectors.

Almost similar to the above, namely the management of protected areas for the protection of natural forests and peat lands with good performance, directed by strategy (1) selecting compulsory and voluntary carbon market system of baseline-and-trade within REDD +, VCM, A / R CDM, UDI, and DNS scheme that has a value of compensation or payment for higher performance (PES pattern). Then, it will also (2) directs this region, especially those which has not as yet managed by the unit management of natural forests and forest cultivation as well as dedicated to producing "green products", (3) maintain carbon stocks by making the region serve as having a protected function or protected forest, biodiversity bank with HCVF priority, and make use as a non-timber forest, (4) to protect and maintain carbon stocks in this region (funding from the grant of bilateral agreements for the implementation of REDD +) as the implementation of forest-based carbon and carbon stock, (5) preventing region from deforestation and forest degradation by maintaining this area from the Provincial Spatial revisions to any compensation (PDR pattern), and set some of the region to function as protected areas and / or protected forest for UDI compensation schemes. Furthermore, (6) establish an integrated innovation development programs that increase the income of the people of this region through cross-sector partnership program, including "green products";

The management in areas for the protection of natural forests and peat lands that are underperforming is directed by the strategy (1) selecting compulsory and voluntary carbon market system of baseline-and-trade and / or cap-and-trade scheme REDD +, VCM, A / R CDM,

UDI and DNS that has a value of compensation or payment for higher performance (PES patterns and LR). LR pattern is directed to carbon off-setting the amount of emissions in the country or company. Then, it will also (2) directs this region, especially those managed by the management unit of the cultivation of natural forest or forest crops, (3) maintain carbon stocks by making this area into protected areas or protected forest, biodiversity bank with HCVF priorities, and utilization of non-timber forest, (3) to protect and maintain carbon stocks in this area (funds from the grant of bilateral agreements for the implementation of REDD +) as the implementation of forest-based carbon, (4) prevent the region from deforestation and forest degradation by maintaining this area from revisions of the Provincial Spatial compensation (PDR pattern), and set some of the region to function of protected areas and / or protected forest for UDI compensation schemes. Furthermore, (5) establish an integrated innovation development programs that increase the income of the people of this region through cross-sector partnership program;

The management of area for forest and land rehabilitation in sustainably managed forests and has good performance (1) prefer a mandatory carbon market that has a value of compensation or payment of a higher performance than the voluntary market. Climate change mitigation schemes can be used is the REDD +, VCM, A / R CDM, UDI, in accordance with the categories of forest area rehabilitated. Then, it will also (2) conduct a careful inventory through remote sensing for its MRV, (3) accelerate the establishment of the boundaries of the area of rehabilitation to reinforce the rights of forest carbon for the managers and / or the concession holder, (4) restoration and improvement is directed at the area where forest has been degraded. Another strategy is needed related to the A / R CDM in forest conservation and protected areas, namely (5) planting tree species that produce non-timber produce, including bio-energy such as gum, “nyamplung” oils, resins, and “bintaro”, “tengkawang”, and others;

In the meantime, the strategy in the management area for forest and land rehabilitation in the forest that has bad performance is (1) selecting compulsory and voluntary carbon market system of baseline-and-trade and / or cap-and-trade scheme REDD +, VCM , A / R CDM, UDI and DNS (compensation patterns and LR PES) as a framework for carbon sequestration. LR pattern could be targeted for carbon off-setting the amount of emissions in the country or company in accordance with the categories of forest areas rehabilitated according to its priority watershed. Then, (2) conduct a careful inventory through remote sensing for its MRV, (3) accelerate the determination of the boundaries of the area of rehabilitation to reinforce the rights of forest carbon for the managers and / or the concession holder, (4) restore and improve forest directed in areas that have been degraded. Another strategy is needed related to the A / R CDM in forest conservation and protection, as well as the production forest (5) planting tree species that produce non-timber. While in the area for forest rehabilitation in production forest can be directed to produce "green products";

Strategies for large-scale forest enterprises that is sustainably managed is (1) prefer a mandatory carbon market that has a value of compensation or payment for the performance is much higher than the voluntary market. Then, it will also (2) prioritize the mandatory markets that provide compensation or to pay the much higher performance, (3) accelerate the strengthening of production forests to reinforce the rights of forest carbon for concession holders, (4) restoration and improvement of forest area are directed at degraded production

forest, (5) implement the innovation with intensive silviculture techniques (Silint) to increase the productivity of carbon uptake. Another strategy is still needed regarding the use of energy, namely (6) large-scale forest entrepreneurs can participate in building new and renewable energy. Logging in the area / location of the remote forest areas, the issue of energy (gasoline, diesel oil) is often an obstacle in the operation. In addition, it also needed a strategy to (7) modify standard SFM performance assessment related to the PI mitigation scheme, and adapted to international standards. Adjustment to international standards is important because the incentives from the international funding that sets its own criteria and indicators, which are sometimes different from the standard applicable at the national level;

Large-scale forest utilization enterprises that are not managed sustainably, the strategy was to (1) choose the REDD + or other schemes that can help improve a company's financial liquidity. Many applicant for forest areas in Indonesia leads to carbon-based management (forest-based carbon, FBC) performed through the licensing process for restoration of forest ecosystems (RE). The target is the location of peat lands for there is where the largest portion of carbon reserves are found. The next necessary strategy is, among others, (2) enable entrance to the voluntary market, although with compensation or paying performance with a lower value, (3) to have effort in gradual certification of large-scale enterprises to enter the forest carbon market, (4) implement an environ-mentally friendly logging techniques with reduced impact logging (RIL) and increase the capacity of officers, (5) directs the REDD + for large scale concessions with a bad grade or in the process of performance improvement to get the certificate, (6) clarify certain areas of work for large scale enterprises to ensure certainty business. The very important thing to do in order achieve success is (7) to enforce consistently the law against traffickers in timber and illegal logging, including mining in forest areas, as well as encroachment and forest fires. In addition a strategy is required (8) to have clear spatial arrangement of the forest and definite legal power to clarify the rights of forest and carbon through the establishment of work area, and (9) diversify the forestry business that does not conflict with PI mitigation scheme;

The strategy chosen by the small-scale forest entrepreneurs with sustainably managed forest is (1) entering the climate change mitigation scheme voluntarily (voluntary carbon market, 'VCM') but the compensation should be higher than the mandatory scheme (A / R CDM) or REDD + which is not mandatory for Annex-1 countries. Option scheme is based on community needs over the short term to meet the needs of everyday life. Another strategy for small-scale forestry, among others, (2) to subsidize small-scale SFM to obtain a certificate for a very limited financial capacity, (3) combines livelihood development goals and poverty reduction with conservation objectives (e.g. combining conservation with projects development), and (4) REDD + for SFM value between medium – good. Technically, it takes strategy (5) clarify the rights of forest carbon through forest rights reform, particularly through the provision of access to public and small-scale forest enterprises to seek business in the forest;

(1) Strategies for small-scale sustainably managed forest do not include (1) selecting PI mitigation schemes that can provide speeds of income, especially schemes for carbon sequestration ('CS') or maintain carbon stocks (through conservation measures, combined with forest development projects). Another strategy is needed to gain

recognition in reducing GHG emissions and enhance forest carbon stocks, namely (2) provide guidance to the people who will enter PI mitigation schemes, (3) assist the process of getting certified to provide subsidies. Small-scale forest concessions under this category is also required to restore forest ecosystems (4) and propose schemes that help financial liquidity, (5) collaboration with the investor to repair and restore the small scale of production forests, (6) and streamline costs for mitigation of PI in SFM. Necessary conditions of weak management strategies (7) applying multilevel organization and multi stakeholders to be more accountable, and the imposition of sanctions need to be clear an in an agreements made by those who collaborate;

(2) The strategy chosen in the management area for non-forestry managed in a sustainable manner are (1) entering into the scheme of mitigation of voluntary carbon market, ('VCM') but with higher compensation or REDD + which is not obligatory for the State (Annex-1). Market must be able to enter the A / R CDM scheme which is usually associated with low-carbon emission as plants grow fast and have a high content of lignin for pellets (bio-energy) as a "green products". Option scheme is based on company needs in the short term the industry needs to supply fuel as a substitute for coal for power generation or other purposes. Other strategies include (2) to subsidize the certification process for HR PHBML or small-scale ecosystem restoration for individuals and society as well as to obtain a voluntary certificate for a very limited financial capacity, (3) combines livelihood development goals and poverty reduction with the goal of community empowerment. This requires a strategy (4) clarify certain areas of work for HR managers or restoration of ecosystems to ensure the certainty of their working area, and (5) clarify the rights of forest carbon through the reform of land rights in the Area for Other Uses (APL);

(3) In the meantime, the management strategy for non-forest area that is not managed in a sustainable manner include (1) selecting PI mitigation schemes that can provide immediacy of income, especially schemes for carbon sequestration ('CS') or maintain carbon stocks (through ecosystem restoration actions outside the forest area, combined with development projects). Scheme that can be asked is REDD +, VCM, A / R CDM, and UDI in the pattern of PDR. Another strategy is needed to gain recognition in reducing GHG emissions and increase carbon stocks, namely (2) provide guidance to the people who will enter PI mitigation schemes, or employers outside the field of forestry, (3) assist the process of obtaining a certificate by providing subsidies to the HR manager or ecosystems restoration. Concessions under this category, not only do large-scale enterprises need to restore forest ecosystems, but also small scale enterprises are required as well (4) restoration of forest ecosystems and propose schemes that help financial liquidity, (5) collaboration with the investor to improve and restore non-forestry area through land rehabilitation measures, (6) make effective and efficient cost streamlining for PHBML PI mitigation, and (7) to make boundary delineation of the area so as to have a definite legal power to clarify the rights of the carbon;

(4) The strategies mentioned above do not accommodate the pattern of funding schemes under the climate change mitigation. The pattern of financing climate change mitigation in an effort to reduce emissions, improve and maintain forest carbon stocks of forest

carbon. Sustainably managed forests have a function as a "warehouse" of goods and services of forestry. Forest carbon stock is calculated according to business as usual-Baseline (BAU-Baseline) which is a forest resource valuation in accordance with its function. In relation to climate change mitigation, sustainably managed forests can serve as (1) storage in forest carbon stocks, (2) carbon sequestration, (3) producing green products, and (4) prevention of GHG emissions;

Basically, the pattern of forest carbon trading can refer to the pattern of environmental payment services (PES), liability rules (LR), and purchasing development rights (PDR). The third pattern can accommodate or as outlets to financial incentives related to the mitigation of climate change on sustainable forest management, such as A / R CDM (Afforestation / Reforestation - Clean Development Mechanism), REDD +, VCM (Voluntary Carbon Market), DNS (Debt Natural Swap), UDI (Upstream - Downstream Incentive) and other schemes. Disbursement of funds can occur after a transaction that can be done through agreements and regulations that are implemented at the site to obtain green actual benefits;

Pattern of financial incentives on climate change mitigation in accordance with the directive of forest functions.

Area allocation, pattern of space utilization, funding pattern and climate change mitigation option scheme

| **Area Allocation** | **Space Utilization Pattern** | **Funding Pattern** | **Climate Change Mitigation Option** |
|---|---|---|---|
| Conservation area | Carbon Stock (CS) Area | PES | Modified REDD+, UDI, VCM, dan DNS. |
| | Carbon Sequestration (‘CSq’) Area | LR | Not Relevant |
| | Avoiding Emission (‘AE’) Area | PDR | Modified REDD+, UDI, VCM, A/R CDM. |
| Area for natural forest protection and peat lands | Carbon Stock (CS) Area | PES | Modified REDD+, UDI, VCM, and DNS. |
| | CS and Green Product (‘GP’) | LR | A/R CDM, VCM, UDI, and DNS. |
| | Avoiding Emission (AE) Area | PDR | Modified REDD+, UDI, VCM, A/R CDM. |

Table cont'd .....

| Area Allocation | Space Utilization Pattern | Funding Pattern | Climate Change Mitigation Option |
|---|---|---|---|
| Area for large scale forest enterprises | Kawasan penyimpanan karbon (CS) | PES | REDD+ (yang dimodifikasi), VCM, dan SFM (HCVF). |
| | CSq and Green Product ('GP') Area | LR | A/R CDM, VCM, REDD+ (SMF), SFM (GP), and DNS |
| | Avoiding Emission (AE) Area | PDR | Modified REDD+, A/R CDM and VCM. |
| Small Scale Forest Enterprises Area | Carbon Stock (CS) Area | PES | Modified REDD+, VCM, and SFM (HCVF – Partnership). |
| | CSq and Green Product ('GP') Area | LR | VCM, REDD+ (SMF), SFM (GP-Partnership), A/R CDM, and DNS |
| | Avoiding Emission (AE) Area | PDR | Modified REDD+, A/R CDM and VCM. |
| Non Forest Area | Carbon Stock (CS) Area | PES | Not relevant |
| | CSq and Green Product ('GP') Area | LR | Modified REDD+, VCM, A/R CDM, and DNS |
| | Avoiding Emission (AE) Area | PDR | REDD+ , A/R CDM and VCM. |

Source: Nurochmat D.R., Widyantoro B., and Tiryana T. (2011)

(5) Some climate change mitigation schemes that have been adopted are the A / R CDM, REDD +, and VCM. (Modified REDD + is an REDD scheme which implementation will be aligned with patterns of spatial utilization and funding). As for schemes such as DNS and UDI can be attributed to climate change mitigation. The pattern of funding (PES, LR, and PDR) will accommodate or facilitate any financial incentives for certain schemes agreed or by regulation, both from the domestic (unilateral) and international (bilateral and multilateral);

(6) For the planning of forest areas that are within its territory, KPH shall prepare KPH a pattern as the basis for the preparation of forest management plans for the management unit. At the provincial level, in the preparation of forest management plans (RPPH) for cross district KPH a strategy ought to be formulated to manage the forest according to the characteristic of watershed (DAS) located in two or more districts. While RPPH at the district level, the strategy is formulated in accordance with DAS or KPH that is located within the district;

(7) RPPH mentioned above, in addition to containing the substance of the utilization of timber in production forest, reflect as well the use of area in each forest function. Management planning system is intended to be more integrated and reflect the characteristics of each area. Similarly, for a plan with a variety of environmental services scheme (A / R CDM, VCM, or REDD +). KPH can serve to make the planning of forest management scheme in its KPH, which within it of course there will be the management

unit (IUPHHK-HA, HTI, HTR, and HKm). There is also a RPPH for the management of HK and HL, unless it is specifically for KPH at the provincial or even national level.

This study recommends that the strategy of improving and maintaining forest carbon through sustainable forest management in Indonesia, the role of each unit management function in forest areas should be done first, namely: (1) data collection system (forest inventory). Especially on IUPHHK, it can be done by the method of comprehensive and periodic forest inventory (IHMB), (2) institutional incentives related to funding and Forest Management Unit or KPH (Conservation, Protection, and Production) must be given high priority with the establishment and strengthening of human resources that are reliable , and serves to foster and control every action of climate change mitigation in the forestry sector; (3) encouraging the functioning of IUPHHK management unit (large and small) that are able to manage the forest with a good performance in mitigating climate change by getting the financial incentives to improve and maintain forest carbon stocks, especially on plantation forest which is capable of absorbing large amounts of carbon compared to other forests, (4) management of forests for conservation and protection of natural forests and peat lands for carbon storage function of forests should be maintained with the involvement of communities in and around the forest, as well as by providing incentives in the form of integrated programs that provide primary and ancillary benefits; and (5) certification process of sustainable forest management (SFM) should be increased related to the mitigation of climate change, especially for small-scale forest enterprises should get a subsidy because of their lack of capacity.

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# INTRODUCTION Bab 1

## 1.1. Background

Carbon dioxide ($CO_2$) released from forest fires and peat lands and carbon emitting industries formed dangerous gasses that could blanket the earth's upper atmosphere causing global warming. Accumulation of carbon emissions ($CO_2$) or Green House Gases (GHG) from industries in developed countries have resulted global environment of air to suffer pollution and create a major impact on global climate change that increases the air temperature at 2° C. Greenhouse gas concentrations in earth's atmosphere continues to increase with the development of industry in developed countries. The issue of global climate change has encouraged developed countries (Annex-1) to have an obligation to reduce GHG emissions by 5% from 1990 emission levels during the period 2008 to 2012 in the scheme of the Kyoto Protocol[1] (Murdiyarso, 2003).

Indonesia has ratified the Kyoto Protocol through Law No. 17 of 2004 on Ratification of the Kyoto Protocol to the United Nations Framework Convention on Climate Change. The forestry sector can do the mechanism through reforestation CDM (Aforestation and Reforestation, 'A/R'). Indonesia as a developing country is not mandatory and can only participate in the Clean Development Mechanism (CDM) through A/R[2] CDM scheme. This scheme will expire in 2012 which still has not shown any real action as a form of implementation of the program to reduce GHG emissions in Indonesia because it is very difficult to meet its requirements.

Followed later by the Reducing Emissions scheme from Deforestation and Degradation Plus (REDD+)[3] which for the developed countries are not legally binding so there is no quantitative targets. Developed countries can take advantage of REDD+ schemes to reduce emissions in the country with the help of funding and technology to developing countries. Indonesia that has the third largest forest after Brazil and Congo, has a great opportunity to capture business opportunities from the scheme. In addition, Indonesia also participated in the

[1] There are three mechanisms that produced the *Kyoto Protocol*, namely *Joint Implementation* (JI), *Emission Trading* (ET), and the *Clean Development Mechanism* (CDM). JI and ET are mechanisms that can only be made between countries-developed countries. Indonesia is still in the group of developing countries to participate in the implementation of the *Kyoto Protocol* through the CDM framework.

[2] The definition of *aforestation* (A) is the planting of forests on previously non-forest areas. According to the terminology of the clean development mechanism (CDM), it is planting a tree or land conversion activities that are not forested since 50 years or more into the forest. Reforestation (R) is the development of plantation forests in former forested area. Meanwhile, according to the CDM, reforestation planting in forest land whose condition is not a forest from the date of December 31, 1989.

[3] REDD + actions cover a wide range of local, national and global level to reduce emissions caused by deforestation and forest degradation, and increasing forest carbon stocks in developing countries. The plus sign indicates an *increase in forest carbon stocks* are also referred to the *regeneration and rehabilitation of forests, negative degradation, negative emissions, and carbon sequestration*.

reduction of GHG emissions. The average level of developed country emissions in 2020 and 2050 should be reduced about 20% and 75% below 1990 emission levels, while developing countries by 2050 emissions level is 15% below 1990 emission levels (Meinshausen, 2007 in APHI 2010). Through Namas (Nationally Appropriate Mitigation Actions), which is the act of emission reduction (mitigation) conducted nationally, Indonesia is committed to reduce GHG emissions. President of the Republic of Indonesia, Susilo Bambang Yudhoyono, in the Conference of Parties or COP-15 in 2009 at a hearing of the United Nations Conference on Climate Change (UNFCCC) in Copenhagen has expressed its commitment to reduce GHG emissions by 26% from Business As Usual (BAU) through its own efforts (unilateral) and up to 41% with international support in terms of funding, technology, and capacity building.

In addition, there is also a GHG emissions reduction scheme that is voluntary through the voluntary carbon market (VCM)[4] which is positioned as the trading of carbon (carbon credit) for emission reduction over 41%. The early pioneers of the VCM is the United States sponsored by organizations that took shelter under the CCX (Chicago Climate Exchange). Historically the biggest buyers of carbon credits from forestry and forest management activities is this voluntary market. It is estimated that approximately 73% of forest carbon credit transactions occur in this voluntary carbon market (Hamilton et al., 2010).

The three schemes allow opportunities for carbon trading for carbon rights holders, which are holders of concessions, national and sub-national government agencies, landowners, and communities (Angelsen, 2011). Based on Presidential Regulation 61 of 2011 on the Strategic Plan (Stranas) REDD + and GHG National Action Plan (NAP), Indonesia relies heavily on the forestry sector in meeting the emission reduction target of 26% in year 2020. Of the target, forestry is given a target of 14% (or 54% of the national target). Thus, the Government of Indonesia (i.e. Ministry of Forestry) must have a comprehensive strategy to achieve those expectations. Government should be required to direct the actors in forestry or forest management, i.e. companies holding Timber Utilization Permit-Industrial Plantation Forest (HTI-IUPHHK), IUPHHK-HA (Natural Forests) as large-scale forestry enterprises, and IUPHHK-HTI, RE, HTR (Forest Plantation), Community Forest (Community Forestry), Village Forest (HD), and forest outside the forest area (HR) as small-scale[5] forest managers. Small-scale forest concessions put more emphasis in terms of managed area, rather than the capacity of management and technology (Directorate General of Planning, Ministry of Forestry, 2010)

Application of sustainable forest management in production forests (SFM) with cutting age beyond rotational harvesting cycle will be able to absorb $CO_2$ in the atmosphere beyond what is emitted (Handhadari, et al., 2010). The expansion of forest plantations which utilize natural forests - not in a degraded area - on the one hand can hamper various national efforts to reduce GHG emissions if the expansion of land used for forest plantations results in

[4] VCM or voluntary carbon market is the carbon market developed not for the purpose of achieving the target reduction of GHG emissions in developed countries agreed by the Kyoto Protocol, but the emission reduction targets created voluntarily by organizations outside of government regulations.

[5] Large-scale exploitation are forest concessions with certain permits with a total area of more than 7500 hectares, while small-scale forest enterprise have an area of less than 7500 hectares.

increased deforestation (Verchot et al., 2010). Directorate General of Forestry Planning, Ministry of Forestry (2011) has compiled a "container" to hold the funds of any climate change mitigation schemes. Some of the schemes mentioned above will be developed in relation to climate change mitigation in Indonesia, could theoretically be accommodated in a container in terms of compensation (payment) for environmental services (environmental services payment, 'PES'), the provision of certain payments by the party responsible for any loss arising from an activity (liability rule, 'LR'), and compensation should be given to the resource owners who did not exercise his right to a particular public destination (purchasing development right, 'PDR'). In addition, other schemes that have not been included in the mitigation of climate change such as debt for natural swap (DNS), and upstream - downstream incentive (UDI) was included in this discussion (Chapter 5).

The three containers serves as the transmission of treatment for the inclusion of financial incentives for actions carried out by forest management in large scale forest enterprises and small-scale community forest enterprise. The amount of carbon credits is determined by the additionality of a project or a carbon-based businesses. The concept of additionality is only relevant to forest with high deforestation / degradation that there is no incentive for countries with low deforestation (eg, India and Costa Rica) or the local community that is able to maintain their forests (Nurochmat, et al., 2011). High rates of deforestation tends to occur in developing countries, which requires political support and substantial funding for the implementation of a particular scheme, such as REDD+. This scheme is not in accordance with national interests as REDD+ schemes tend to follow the concept of “Purchasing Development Rights” (PDR) (Nurrochmat, 2011). The choice of a scheme for a particular pattern that can be used is an option for managers or project developers in considering the benefits.

Challenges to be faced in the PHL to reduce GHG emissions, maintain and enhance forest carbon stocks include (1) high balance cost to maintain production forests, (2) un-guaranteed forest land use rights, (3) inappropriate basis of policies and regulations, (4) waste in the forest along the production and marketing chain, and (5) failure to detect and suppress forest fires and encroachment (Putz and Rice, 2011). There are still some other challenges, but with less weight with solutions not regarded as a difficult challenge, namely, among others (6) apply silvicultural techniques that are environmentally friendly through reduced impact logging (RIL), and (7) institutions that are not solid and adequate particularly in on-site management.

The fundamental weaknesses associated with SFM in the efforts to reduce emissions, maintenance, and enhancement of carbon sequestration, among others, are (1) weak commit-ments of permit holder to implement sustainable forest management, (2) the cost of certifica-tion is still too expensive for most of the production forest management, (3) limitations of trained staff to eco-friendly logging (Reduced Impact Logging, 'RIL'), (4) weak law enforcement for forest managers who do not obey the laws of forestry and environment, and (5) lack of incentives for managers of sustainable forest management. If the deficiencies are not imme-diately addressed, carbon rights holders – including forest concession holders – will have difficulties to obtain financial incentives or other incentives in these efforts.

To formulate a GHG emissions reduction strategies, maintenance, and increase carbon sequestration in SFM, the following need to be addressed (1) what is the right strategy to

optimize the business potential and opportunities for environmental services of forest carbon, (2) how to implement these strategies through action plans effectively and efficiently, and (3) who is responsible for each action plan in order for clear accountability and responsibility. These questions are discussed in depth in this study so as to provide the best solutions to contribute to lowering greenhouse gas emissions in Indonesia.

To that end, ITTO Project PD-RED 007/09 Rev. 2 (F) conduct a study to formulate emission reduction strategies, maintenance, and increased uptake of carbon through sustainable forest management (SFM). Information that supports various potential and business opportunities for carbon trading in the production of sustainable forest management will be inventoried, and on the other hand the challenges and weaknesses in forest carbon trading needs to be addressed so that the strategy will be formulated to be effective and efficient. ITTO PD-RED 007/09 Rev. 2 (f) allocates activities to reduce GHG emissions, maintenance, and increase the uptake of carbon in the sustainable forest management in the production forest of Indonesia. Initial activities have been undertaken by the project to review the policies and regulations related to climate change mitigation through the SMF implementation and review of technical substance.

## 1.2. Vision and Mission

No specific document at the Ministry of Forestry mentions the vision and mission of sustainable forest management in Indonesia. There is only a vision of the Ministry of Forestry of which is "Forest for Equitable Community Welfare". In the national REDD + strategy it is stated that the vision is "Sustainable Development based on the Implementation of Sustainable and Equitable Forestry and Support the Climate Change Mitigation Efforts". Meanwhile, in a directive speech of the Director General of Forest Utilization Development, Ministry of Forestry in the Focus Group Discussion (FGD) on National Strategy for Improvement and Maintenance of Forest Carbon Stock through Sustainable Forest Management activities in Indonesia expressed his vision associated with this study as "The acquisition of Certificate in Sustainable Forest Management in Indonesia for all permit holders of IUPHHK-HA and IUPHHK-HT in year 2020".

The three visions mentioned above essentially provide the key words associated with the development of forestry and climate change mitigation, namely (1) certified sustainable forest, (2) community welfare, (3) equitable, and (4) mitigation of climate change. Based on these key words, then the agreed vision is **"Realizing Sustainable Management of Indonesian Forest and Certified for Supporting Climate Change Mitigation and Equitable Community Welfare"**. That vision should be achievable by year 2020. Therefore, the sustainable management of Indonesia's forests must be fully certified in 2020 to support climate change mitigation and community welfare.

Mission to become steps of achieving this vision by year 2020 through the sustainable management of Indonesia's forests is as follows:

1) improve the management of Indonesia's forests and to require the entire forest entrepreneurs in Indonesia to certify sustainable forest;

2) reduce greenhouse gas emissions, improve and maintain forest carbon stocks in a variety of schemes in climate change mitigation;

3) develop financial incentives that are packaged in a container framework and specific funding to decrease emission, increase and maintain forest carbon stocks;

4) improve welfare of communities in and around the forest through a variety of income earned from actions intended to reduce emissions, improve and maintain forest carbon.

Involving managers, government, private and community in sustainable forest management in Indonesia has become very vital. The sustainable management of forests is related to the objectives of sustainable development, while improving community welfare is linked to the objectives of the Millennium Development Goals (MDGs).

## 1.3. Purpose and Target

The purpose of this study was to determine the right strategy in an increase in carbon stocks through climate change mitigation schemes in order to achieve the target of reducing GHG emissions in the forest by 14% from 26% national target unilaterally (without foreign aid).

The objectives stated above will be done by performing various actions until the year 2020 as stated as follows:

a) reduce emissions from deforestation through forest fire prevention and forest encroachment (0.2 mill. t.$CO_2$e), eradicate illegal logging (0.053 million t.$CO_2$e), and regulate forest area use and release;

b) lower the emission from forest degradation through action in balancing carbon (25.3 mill. t.$CO_2$e.), and restoration of conservation area and protection forest (13 million t.$CO_2$e);

c) increase carbon stock through planting in Community Forest and Village Forest (187,3 mill. t.$CO_2$e), Forest and Land Rehabilitation in River Catchment Area (120,9 mill. t.$CO_2$e), Industrial Forest Plantations and People Plantation Forest (337,1 mill.t.$CO_2$e), Ecosystem Restoration (178,8 mill.t.$CO_2$e), People Partnership Forest (48,7 mill.t.$CO_2$e), at the same creating green products from these actions;

d) manage sustainable forest through intensive silviculture or Silint (73,3 mill.t.$CO_2$e), Indonesian Selective Cutting and Planting and Reduced Impact Logging or RIL (250,9 mill.t.$CO_2$e), and certification of Sustainable Production Forest (15,9 mill.t.$CO_2$e);

e) tend forest in sustainable manner through techniques of Silint, TPTI, RIL, and PHL/PHPL certification, and enhancing community welfare through various activities related to climate change mitigation actions, especially by providing access and enhancing capacity of small scale forest enterprises and at the same time enhancing community welfare within and around forest area.

Long-term goal of the implementation of reduction of GHG emissions, sequestration / storage of carbon is (1) to reduce GHG emissions from the sector of land-use and land-use

change of forest (LULUCF) and or REDD +, as well as the voluntary carbon market (VCM), (2) increase sequestration / storage of carbon, (3) ensure the preservation of biodiversity, and (4) enhance the value and sustainability of forest ecosystem function.

Targets to be achieved include the eradication of illegal logging and illegal mining in forest areas, countermeasures for forest fire, forest area release, the reduction of emissions through an annual production quota for the carbon balance, increase carbon stocks through forest plantations and sustainable forest management through intensive silviculture (Silint) and certification of sustainable forest management (SFM). Target to be achieved by 2020 are as follows:

(a) Eradication illegal logging, reducing it by 15% per year (year 2009 = 104 cases, year 2020 = 17 kasus) or equal to 0.05279 million ton $CO_2e$;

(b) Forest fire countermeasures (year 2009 = 0.80 million ton $CO_2e$, and year 2015 to become 0.20 million ton $CO_2e$);

(c) Area release = 4.2 million ha (20 year) from large and small scale enterprises forest area;

(d) Emission reduction: toward carbon-balance of natural forests (in the Work Plan) = 17 million m3/year, but targeted only 9 million m3/year (equivalent to 24.5 million $CO_2e$), whereas Perhutani State Forest Enterprise (RKPH = 1.2 million m3, target = 0.8 million m3), as well as restoration of conservation areas;

(e) Increasing carbon stocks through HKm and HD = 5.5 million ha, RHL DAS = 3.55 million ha, HTI and HTR = 5.8 million ha, RE = 5.75 million ha, HR Partnership = 0:55 million ha;

(f) Sustainable Forest Management through Silint = 0232 million ha (= 71.3 million tons of CO2e), TPTI, RIL = 900 ha per Unit Management = 54 000 m3/year (= 0.2 million tons of CO2e) and certification of SFM = 14:15 million ha (4.3 GtCO2e); management of conservation areas, protected areas of natural forest and peat land area of 54.5 million ha.

(g) Sustainable Forest Management through Silint = 0232 million ha (= 71.3 million tons of $CO_2e$), TPTI, RIL = 900 ha per Unit Management = 54 000 $m^3$/year (= 0.2 million tons of $CO_2e$) and certification of SFM = 14:15 million ha (4.3 $GtCO_2e$); management of conservation areas, protected areas of natural forest and peat land area of 54.5 million ha.

Targets mentioned above will be quantified into equivalent volume of $CO_2e$ to various forest management activities to support climate change mitigation, which includes the prevention of greenhouse gas emissions, improvement and maintenance through a forest carbon sequestration and storage. Detail included in the action plan (Appendix Table 1).

## 1.4. Output

Output in general which is expected as the results of this study is formulated strategies for the enhancement and maintenance of carbon stocks through sustainable forest management in climate change mitigation schemes, such as REDD plus, VCM, and A / R CDM in sustain-

ably managed forests. While the pattern of funding that can accommodate any scheme to be used will be described in Chapter 6. As for the particular output of this study is as follows:

(a) identification of strengths, weaknesses, threats, and opportunities for forest managers to decrease greenhouse gas emissions, maintenance, and increase the uptake of carbon as an environmental services business in forestry;

(b) GHG emission reduction strategies, maintenance, and enhancement of carbon uptake through climate change mitigation scheme (A / R CDM, REDD plus, and VCM) in sustainably managed forests can be determined in order to achieve the emission reduction target to 14 percent of the forestry sector (unilateral);

(c) formulation of the national action plan of reducing emissions of greenhouse gases (GHGs RAN) strategy that has been determined based on the above analysis through the sustainable management of forests in Indonesia;

(d) embodiment of every funding incentive for climate change mitigation scheme to provide compensation for sustainable forest management that enhance and maintain forest carbon stocks.

Policies needed to realize the vision and mission on which Indonesia is to improve forest management certification of sustainable forest management (SFM), prevent greenhouse gas emissions, improve and maintain forest carbon stocks while increasing comfort, preventing disasters, employment absorption, and increase income of community, companies, and the country, and developing financial incentives to fund actions that reduce emissions, improve and maintain forest carbon stocks. Derivative of the policies to be defined, then developing a strategy of improvement and maintenance of forest carbon through sustainable forest management and action plans in order to provide guidance on the implementation and responsibilities both to the Government, private, as well as community.

The output of the above plans can be changed according to the results obtained from the activities of the forum group discussion (FGD) to be held after the draft strategy is compiled. Draft improvement after receiving input from each focus group to refine the writing of this manuscript.

## 1.5. Scope of Study and Understanding

Figure 1 below explains the concept of REDD plus the scoping of the *sustainable management of forest* (SMF)[6] with some of the following activities:

(a) reduce carbon emissions from deforestation (function conversion of forests into non-forest);
(b) reduce carbon emissions from degradation (the practice of *sustainable forest management*, SFM);

[6] In the context of *reducing emission from deforestation and degradation plus* (REDD +), understanding of *Sustainable Management of Forest* (SMF) is distinguished from *Sustainable Forest Management* (SFM). SFM is in the area of *large and small scale exploitation* of forest.

(c) conservation through prevention of emission / conservation of carbon stock;
(d) increase of carbon stock through reforestation and ecosystem restoration (RE), as well as addition;
(e) increase carbon sequestration by regenerating and rehabilitating degraded forests through afforestation and reforestation (A / R) of degraded forest land.

Based on scoping, the SFM is an action for long-term goals towards SMF which lower emissions from deforestation and forest degradation, in addition to reduce emissions from deforestation, prevent the emissions / carbon stock conservation, and increase carbon stocks (reforestation and ecosystem restoration). Strategies needed for each forest management unit is different. The concept of REDD plus that lead to carbon-based forest management has a similar strategy, so that strategies for the four or five of these activities will be specified according to the strategy that represents each of these activities.

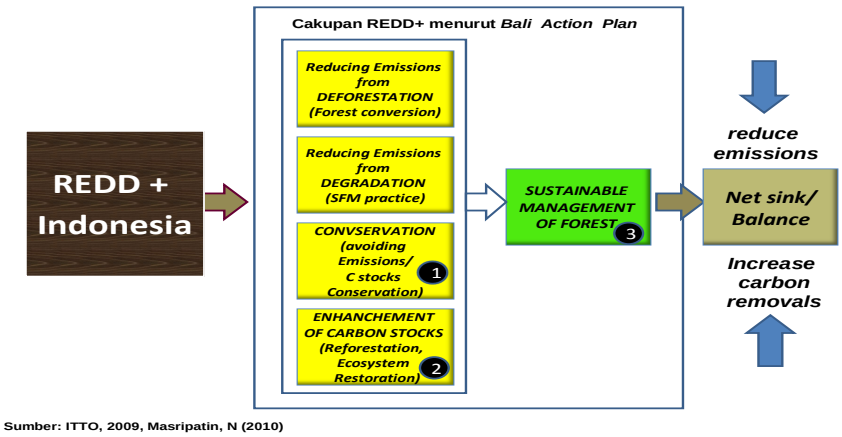



Figure 1. Implication of REDD Plus (REDD+) in Indonesia.

The concept can be developed for other schemes that can be applied in any directive of the forest are . In addition to REDD +, there is another scheme that is A / R CDM and *Voluntary Carbon Market* (VCM) that can be filed to obtain an emission reduction funding, maintenance, and enhancement of forest carbon uptake, be it for the mobilization of funds domestically as well as abroad. Especially with regard to A / R CDM is not discussed in depth because of the high level of difficulty regarding the requirements. A / R CDM is the embodiment of action to make non-forest land to forest land. (see Figure 1).

The VCM has a potential in obtaining incentive funding for mitigation of climate change in which the concessionaire may contribute to the reduction of GHG emissions, increase and maintenance of forest carbon stock in Indonesia through sustainable forest management. Activities of RDD + is a momentum to wholly improve forest condition in Indonesia.

To achieve it, it is necessary that effectiveness can be measured both in terms of real emission reductions, and in terms of implementing improved governance and administration, policy and law enforcement.

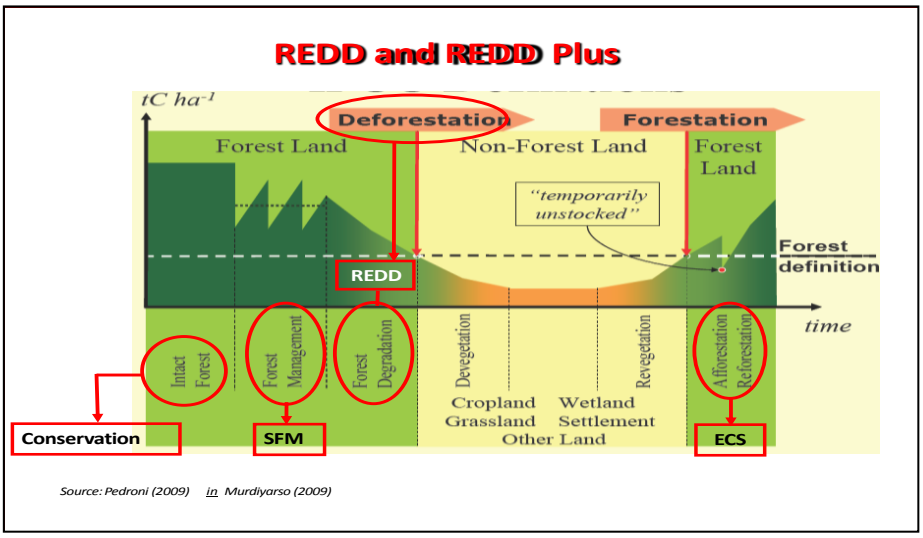



Figure 2. Diorama of forest land-non forest-forest land according to changes in forest cover as a consequence of human intervention (Pedroni, 2009)

Figure 2 provides information about changes (diorama) ranging from forested conditions (forest land) deforested and degraded and continues until a point beyond the definition of forest to non-forested (non-forest land), then through the various measures of reforestation (afforestation and reforestation) back to forest land. This picture inspires to avoid emissions, increase forest carbon stocks, and maintain forest carbon stocks.

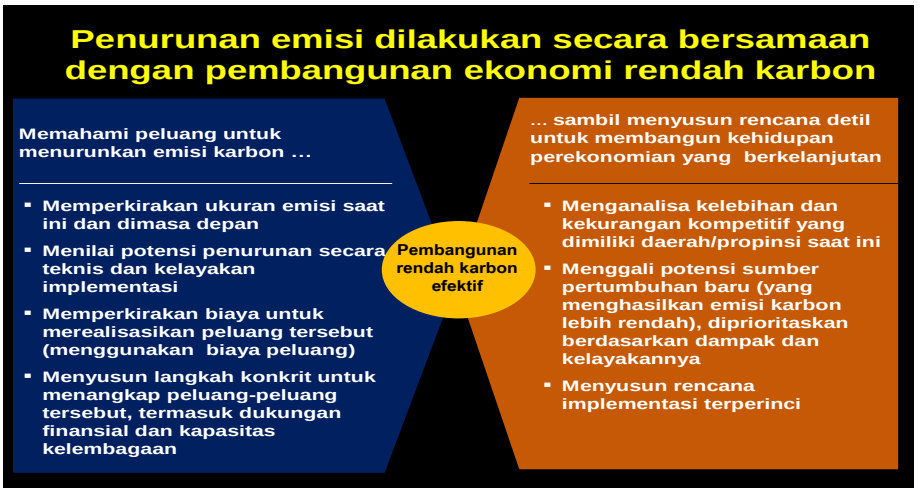



Figure 3. Concept of low development of effective carbon

REDD + activities in Indonesia should be viewed as a long-term activity, financially profitable, ecologically and socially acceptable while still maintaining efficiency in the context of the implementation of the program. In general, this is interpreted as an implementation program that emphasizes careful planning and can answer any challenge. It also means that the implementation of REDD + should be cost efficient and effective in the use of its funds.

In implementing REDD +, the principle of equality for all people and promoting human rights protection in forest management should be the main principle. This includes calculating the economic impact of social culture in the implementation of REDD+ in Indonesia.

Transparency will provide a thorough understanding of the stakeholders so that there is an involvement that is based on a thorough understanding. In the end the application of REDD + can be accountable and fulfill aspects of equitability in the context of forest management. Implementation of REDD + will be able to be accounted for as a whole to the whole people of Indonesia and the international community, both in terms of implementation, funding, and the results obtained.

## 1.6. Method of Study

To identify strengths, weaknesses, opportunities and threats to forest management units using the SWOT method and equipped with PEST (Policy, Economic, Social and Technology) as well as international legalization. REDD plus strategies in sustainable production forest management practices in Indonesia should have the capability of international competitiveness. Meant by management unit here are holders of forest licenses in utilization of timber (IUPHHK) and or environmental services (IUPJL) especially in the production functions of forests in Indonesia.

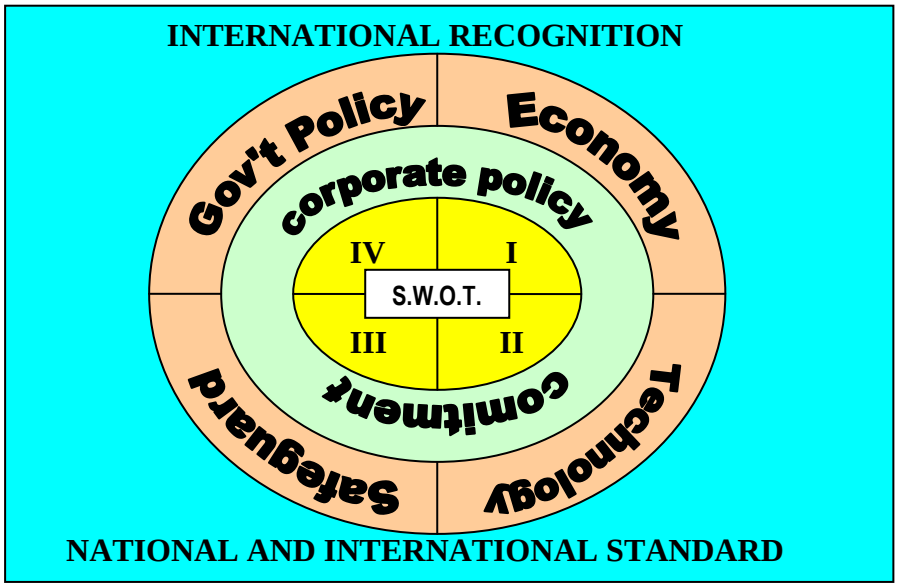



Figure 4. Analysis on *REDD+, A/R CDM, and VCM* Strategies in Sustainable Management of Forest

REDD plus strategy that has been prepared by the Task Force of REDD plus is conducted through the "fish bone" method. The result is a strategy adopted to achieve the successful implementation of REDD plus in the four or five of the above activities. In contrast to studies conducted by the Task Force of REDD plus, the strategies of REDD plus that will be done on sustainable management of forest including the management of large scale production forests (natural forests, plantation forests, and ecosystem restoration) as well as small scale forest management (HKm, HD, and HTR). Nevertheless, the results of studies conducted by the Task Force will become the main reference in this study. The review of the scheme A / R CDM and VCM to formulate a GHG emissions reduction strategies, maintenance, and enhancement

of forest carbon uptake is a separate section because each has specifications which are different from each other.

The action plan that will be prepared will have a more detailed elaboration of strategies that have been determined. The action plan includes several actions that should or must be done to implement the strategy. The action plan will also specify when it will be achieved, who is responsible, how to achieve it, where the work area /location is situated.

To obtain a more complete picture , discussion on this study has been carried out five times with the stakeholders through the FGD, participated by among others government agencies, forestry associations, domestic and foreign nongovernmental organizations (NGOs), private sector, and universities. Included in the review process, writer refers to the writings about REDD plus, A / R CDM and VCM related to sustainable management of production forest.

## 1.7. Assumptions

Above mentioned objectives and targets to be reached used assumptions as described in Table 1. The assumption is the basis of the performance to be achieved by a selected strategy for the improvement and maintenance of carbon stocks through sustainable management of the forest in Indonesia until the year 2020.

Table 1. Basic assumption of the calculation of the increase and maintenance of carbon through PHL on forests in Indonesia until the year 2020.

| Climate Change Mitigation Actions | $CO_2e$ Absorption | $CO_2e$ Storage | Emission Reduction ($CO_2e$) |
|---|---|---|---|
| Stage in plant growth | 8 - 25 t.$CO_2e$/Ha | - | - |
| Development of Plantation Forest (HT) on degraded land | 627 t.$CO_2e$/Ha | - | - |
| Conversion of agriculture land into forest | - | 18 - 20% increase | - |
| Conversion of alang-alang fields into forest | - | 5 - 10% increase | - |
| Emission reduction from deforestation and development of forest plantation (HT) on degraded land | - | - | 30% increase in year 2020 |
| Fire decrease, decomposition, and management of water in peat land | - | - | 13% increase |
| Development of HTI on untended land (in 10 years) covering two million ha. | Increase of 87 million t.$CO_2e$ | - | - |
| Silviculture implementation (TPTI & TPTJ) with cutting volume of 75% normal AAC in 10 years | - | 18% increase | - |

Source:
(a) FORDA, Ministry of Forestry, 2009
(b) National Board of Climate Change (DNPI, 2010)
(c) ITTO PD-RED 007/09 Rev. 2(F) and Rusolono, T. 2012.

In addition to calculation of technical assumptions above, other assumptions are also existing, as follows:

(a) Forest area for certain function could be kept until year 2030 with a total area of 112,34 million hectare (Forestry RKTN, 2010), consisting of 23,2 million hectare of forest area for conservation function, 28.4 million hectares of natural forest protection functions and peat lands, 11:55 hectares of land rehabilitation functions / forest, 43.62 hectares of large-scale forest enterprise function, 5.57 million hectares of small-scale forest enterprise function, and 18.34 million hectares of non forestry function;

(b) Government policy did not change drastically within the next 10 months;

(c) International policy on adaptation and mitigation of climate change under the UNFCCC, and/or LULUCF remains committed to its mission to reduce GHG emissions, increase carbon stocks;

(d) Conversion factor of 3.67 as a multiplier to obtain the value of forest biomass equal tonnage of carbon dioxide absorption (t.CO2e) from the atmosphere.

# Bab 2 FACTORS SUPPORTING SUSTAINABLE MANAGEMENT OF FOREST IN MITIGATING CLIMATE CHANGE IN INDONESIA

Within the framework of climate change mitigation in forestry, a national policy and strategy is now established by the REDD plus task force under the coordination of Presidential Working Unit in the field of Control on Development Implementation (UKP-4). This strategy was outlined by the National Action Plan (NAP) to Decrease Greenhouse Gas Emissions with specific targets for each action. The RAN has no specific detail as yet in describing the role of the Sustainable Management of Forest (SMF) in contributing to lower emissions and increase carbon stocks, both in the Forest Conservation (HK), Protected Forest (HL), and Production Forest (HP). Conservation and Protected Areas is managed by the government, including efforts to rehabilitate damaged areas or degraded forests through forest and land rehabilitation measures (GNRHL), whereas production forests are managed by concessionaires and communities through large and small scale forestry by sustainable forest management (SFM).

Especially in the practice of SFM (Sustainable Forest Management), a dual function that can be played by the PHL are (1) its ability to reduce emissions avoiding degradation and / or deforestation, and (2) increase the reduction of GHG emissions, which means the increase of carbon stocks through restoration, improvement of degraded forest areas and forest preservation. However, in maintaining its double function, particularly PHL in production forests experiences a variety of very strong pressure by various parties, both from outside and from within, the only impetus being profit taking by holder of the concessionaire itself (Sukadri, et al. 2011).

Main problems in SFM related to efforts of reduction of GHG emissions and increase of carbon stocks include (1) high opportunity cost to maintain production forests, (2) uncertainty of the working area of forest management, (3) inconsistent policies and regulations of forestry , (4) inefficient use of timber production, and (5) failure to detect and suppress wildfires in production forest (Putz and Rice, 2011). There are still some other problems, but its weight is less powerful and that the solution is not as difficult as the problems mentioned above, such a procedure to obtain government approval, ownership and distribution of carbon benefits, limited market access as well as unclear market demand (Association of Indonesian Forest Entrepreneur ‘APHI’, 2010). In addition, local governments are unprepared and weak institutional set up to accommodate opportunities for climate change mitigation funding schemes.

Weakness of forest entrepreneur managers associated with climate change mitigation in Indonesia, among others, are (1) have not understood some of the schemes to mitigate climate change, both technical and funding incentives, (2) the cost of forest rehabilitation that leads to certification is still too expensive for most production forest managers, (3) lower than optimal results of environmentally friendly logging (Reduced Impact logging, 'RIL'), (4) weak law enforcement for forest managers who do not obey the laws of forestry and environment, and

(5) lack of incentives for sustainable forest management. If the deficiencies are not addressed and corrected, carbon rights holders, including holders of concessions will have difficulty in obtaining financial incentives or other incentives in these efforts. Explained below is how these factors supporting sustainable management of forest could reduce greenhouse gas emissions and enhance forest carbon stocks.

## 2.1. Ability to Suppress High Opportunity Cost in Forest Preservation

Forest area, both forest conservation (HK), protection forests (HL) and production forest (HP), are always under pressure from outside the forestry sector for the benefit of the expansion of plantations, transmigration of area / city, settlement, community encroachment, illegal logging and mining of coal, and others. Forest managers (government and forest concessionaires) are not supposed to put the interests of a moment, but the sustainability of forest development is an important part in maintaining the balance of nature (the environment). Production forest concession holders are not supposed to harvest timber only to make profit, but must carefully manage forests sustainably (Rice et al. In 1997 Angelsen, 2011).

When access is made easier (as in HP) and flat topography means forested land to be suitable for plantation and agricultural crops, forest become an obstacle to the intensification of land use (although logging and timber sales is financing deforestation / forest degradation). While the Limited Production Forest with poor access, with sloping to steep slope topography, with unsuitable soil for intensive crop plantation, and weak governance often hampers long-term investment. In such circumstances, the holders of logging concessions apply some better techniques and save money. It would not otherwise be profitable if it apply better management on a large scale (Putz et al. In Angelsen, 2011). Another thing that greatly inhibit the action of lowering GHG emission, namely the existence of mines in the forest. Those who are hungry for riches will exploit the wealth to the maximum without regard to forest damage caused by actions that will affect the performance of sustainable management of forest.

On the basis of the foregoing considerations it is regarded that many of the sustainable management practices may be applied only if the effective enforcement of rules is supported by financial incentives or other incentives (such as providing convenience services, especially for sustainable forest management, SFM, and for other managers in forest conservation and protected forests who received certificate with good predicate). This requirement means that the activity in climate change mitigation schemes will have an additional clear requirement, and may be burdensome to forest managers and / or concessionaires who at the end failed to obtain financing incentives. Actions that prevent emissions from deforestation and forest degradation should be compensated equitably to provide incentives in the sustainable management of forest.

## 2.2. Assurance of Forest Management Work Area

The first demand of managers and/or the concession holder is an assurance of forest area under management since it is a guarantee of the certainty of the management for long-

term effort. However, it does not mean that the boundaries are well constructed properly in the forest areas and have been able to guarantee the certainty of the forest. Most needed to maintain certain forest areas include compliance with the law and the welfare of community that gets better. PLH practices which are not undermined by other outside business interests in forest area, or by a group of concerned people who use the land to meet the needs of their daily life or for their survival. Clarity of land tenure will not drive action of other sectors and communities that do not have permission to participate in exploiting this weakness.

The strength of the license agreement of timber utilization (IUPHHK) is legally binding and is another form of resource use rights, is one of the biggest contributing factor in the PLH (de Graaf 2000). Specifically in HP, for communities and holders of concessions, unguaranteed land use rights will hinder the strength of a contract and raise the discount rate in the private sector (Richards and Moura Costa 1999). Strong governance and guaranteed forest and land use rights generally leads to lower costs for maintenance of forests, reducing illegal logging, and timber prices remained stable (Tacconi 2007c). On the other hand, secure land use rights will allow the concessionaire to attract capital that will help accelerate the destruction of forests, especially if the intensification of land use is attractive in terms of finances, and not hampered by existing government regulation (Gould et al., In Angelsen 2011).

In production, the limitations of the state forest managers in developing a business adds to the difficulty of increasing plantation investment, both in natural forests and in forest plantations. State forest lands could not be put as a collateral guarantee to attract capital from banks or development investments, except crops on plantations that can be pledged. Guarantees of plantation can be obtained through banks which are still reluctant to channel their funds for investment in forestry because of the very high risk venture. Forest land use permit is obtained through the utilization of timber (not the forest management rights), but the concessionaire is still burdened with proper rights management. In practice, the entire activities of the utilization of timber concessionaires are charged to the concession holder due to government budgetary constraints to determine the assets of the national forests through forest inventory.

## 2.3. Consistency in Forest Policy and Regulation

The large number of forestry regulations that are sometimes very complex, particularly the regulations relating to forest concessions is complained by concessionaires and land owners. It should therefore be simplified to increase the enthusiasm of entrepreneurs in the management of forest. Simple rules that encourage the reduction in the discount factor for private enter-prises because of smaller possible errors or even minor violations that can be utilized by the implementing surveillance activities in the field. Simple rules will not be detrimental for large-scale concession holders, as well as for the small-scale forest entrepreneurs (Nugroho et al., 2011).

In addition, forest policy consistency should be maintained and the policy does not exclude other sectors in the growth process. Flagship programs housed within the technical officer's decision which is not arbitrary, must be recognized as the authority of the government official at that particular time. Officials ought to understand that there are social-economic background in the location of implementation. Adequacy of extension in tropical countries will be able to improve conditions related to the formulation and implementation of good forest management plan.

PHL performance measures should not only be viewed as a requirement to fulfill obligations (compulsory/mandatory) to the government, but must be applied as sustainable management of forest practices for long-term sustainability of their business. Such conditions will support the implementation of effective climate change mitigation initiatives. If this condition is done then the actions to reduce emissions and increase carbon stocks in forests will be better and in line with efforts to promote better forest management (Levin et al., 2008).

Other supporting factors which relate to the above is a strict law enforcement to forest managers who do not obey the laws of forestry and the environment. Production forest recovery due to controlled logging and illegal logging will further increase the potential from year to year. Increased potential should be immediately followed by an increase in forest productivity that will immediately improve degraded areas.

Policy on the certification for sustainable forest management which is an obligation of forest manager should be implemented as a manager's responsible for sustained continuity of the enterprise. Real indication to date showing the decline in the number of enterprises in natural production forests should be given clear warning to improve their forests in accordance with its sustainable function. It is right to seek and streamline the cost of repairing the damaged forests, while lowering the cost of the process of obtaining a certificate of SFM and the incentives should be felt substantially by the entrepreneur.

Policies that do not give each other a strong authority, such as Government Regulation (PP) of the Republic of Indonesia Number 38 Year 2007 regarding the Division of Government Affairs between the Government, Provincial and Local Government of District/City, and PP No. 61 Year 2010 concerning Organization of Forest Management Unit (KPH) from the Ministry of the Interior. The dispute between the two agencies question each authority between the Ministry of Interior and Local Government, particularly in the Determination of Forest Management Unit (FMU) resulting disturbance in the organization and filling of positions in the KPH.

## 2.4. Efficient Utilization of Wood

In forest management practices with particular silvicultural systems, such as selective logging, an estimated 20% of the volume of timber harvested can be lost in the logging or abandoned and left to rot because of practices that tend to be wasteful (Sist and Bertault 1998 in Angelsen 2011). Timber volume is considered to be abandoned as a waste of tree branches (Ø <40 cm) which should still be used for wood processing, e.g. for veneer, sawn timber, woodworking, wood flakes (chips), wood energy, and other so on. This is due, among others, to the more expensive cost of transporting wood, and the imposition of levies to fund reforestation

equated with large-diameter wood (Ø> 50 cm) so it is not balanced by the sale of processed wood.

Supposedly, a minimum 70% of total timber volume of trees harvested reaches sawmills. Yield at sawmills in Indonesia, for both natural wood and timber plantations should be able to reach more than 50%. Sawn timber drying can lead to an additional 10% loss of volume. Finally, if the board is dry processed into furniture or other goods, then the yield should be increased not less than 70%. For veneer and plywood yield is generally higher because the refinery is more efficient and just process selective logs (Putz and Rice 2011). Development of technology capable of processing more efficient wood should be followed by better utilization because investment costs or procurement of machinery and support equipment is very expensive, while the wood value is not much higher.

## 2.5. Successful Detection and Suppression of Fire in Production Forest

Most natural forests rarely burn, except at times when it is very dry. Degraded peat lands and degraded forests cover extensive area and is fire-prone. If there is a fire it can reach thousands of hectares of forest in a single forest management unit. Forest plantations are much more prone to fire than natural forests due to the cover of the forest vegetation that is more open and contain litter that is dry and highly combustible by even a small flare of fire. Small wildfire burning often occurs by the public or the entrepreneur who opened the forest using fire for the cultivation of food crops and plantations. Moreover, at peat lands where it is very vulnerable to fire if regulating the setting of surface water is not proper (Wibowo, 2007).

Early detection system (early warning system) developed by the Ministry of Forestry should be able to provide spot information to all forest managers and those in charge of forest monitoring in the area. The effectiveness of the handling of forest fires need to be increased by increasing the forest fire-fighting equipment and fire road to the location must be easily accessible. Long-term impact should not be underestimated by forest managers, although is considered as low intensity. Land in the inner layer of burnt soil and plants will be left with the carbon stored in trees and soil. However, the opposite effect of increasing soil fertility for crops encourages people to do things that destroy them. Technologies of processing land without fire must be developed to avoid the very real threat and could increase GHG emissions to become higher.

## 2.6. Clarity in Market Demand, Ownership of Carbon Rights and Profit Distribution

Schemes used to compensate for the forest management unit, both large and small scale should be clear. It is time for domestic market which has sufficient potential to be realized in reality. Funding sources, such as those derived from domestic buyers, entrepreneurs with production process that generates emissions and pollution, changing forest ecosystems, production process resulting in pollution and emissions, reforestation funds and corporate

social responsibility (CSR), philanthropy fund/foundation of large entrepreneur in Indonesia can actually be mobilized for the purpose of reducing emissions and increasing carbon stocks.

Foreign market demand is still not running in line with expectations, in particular for mandatory and legally binding schemes such as in the scheme of the clean development mechanism ('CDM'). While the voluntary carbon market, ('VCM') has already been done by some countries, like Australia, Norway, Germany, South Korea, Japan, and others outside the CDM mechanism. In Asia, countries of South-Korea and Japan to develop the carbon market mechanism according to the A/R CDM scheme. Although the limited market access due to the limited information obtained by the concessionaires must be entered in order to improve its performance. In general, the role of carbon markets come into being because brokers who are trusted to use and distribute the funding. This situation should not be a barrier, but it should be a challenge on how to solve it. In addition, institutional and organizational arrangements at the local or regional level should continue to be addressed to accommodate funding opportunities for climate change mitigation schemes.

Mechanism of reduction of GHG emissions from deforestation and forest degradation, storage of carbon through the role of conservation, sustainable forest management practices, increase of carbon stocks (known as REDD +) is still not clearly accepted scheme by non mandatory countries of Annex-1. Negotiations experienced a more difficult journey in nearly five years since the REDD was presented at COP-13 in Bali which produces the Bali Action Plan (BAP). Indonesia should not be lulled by the condition and situation, on the contrary should be able to give good example to the world. By mobilizing domestic funding through various means, such as by repairing and restoring degraded forests, forest and critical lands will improve forest carbon stocks as well as reduce GHG emissions to save the nation and people from various disasters, especially drought and floods in various places in parts of Indonesia.

The fact that some of the schemes to mitigate climate change have not been clearly understood, both technical and incentive mechanisms need to be socialized through various institutions and the media so that forest managers will be more enthusiastic to enter the to be used schemes. Bahruni (2011) states there is a reluctance of forest managers to enter the carbon market as funding incentive to be received is very small when compared with the timber business. Equality expected from the acquisition of environmental services for termination of logging in sustainably managed forests should be above U.S. $ 42 per ton of carbon. Thought to provide incentives (good service, reduction in taxes, or build a conducive investment climate) should continue to be pursued by the government to encourage forest managers to improve and maintain forest carbon stocks.

Forest carbon ownership and profit distribution should be clarified so that it will facilitate the acceptance of climate change mitigation schemes. The role of communities in the forest has become part that could not be ignored in implementing certain schemes. Equitable distribution of benefits must be fair to who is entitled to receive the benefits of emission reduction measures and an increase in carbon stocks.

## 2.7. Tenure and Carbon Rights Clarity

REDD + task force has identified the problems associated with land tenure, namely (1) the settlement of land conflicts is not complete, (2) indigenous communities have no formal rights, (3) the scarcity of alternative livelihoods and income sources. Various attempts have been made by large-scale forest managers, but have not produced a clear pattern in meeting community expectations.

Access schemes and capacity building of communities in forest management which are made available for example people forest plantation (HTR), community forestry (HKm), and the forest villages (HD) needs to be continually improved in order to overcome the problems that arise related to land use and forest resource use. On the other hand, the forest for people (HR) that was developed outside the forest area has gained a better position, but it happened and was developed only in the island of Java, while it has not been developed outside it. This situation needs to be improved by giving understanding and enhance the value of the product to be developed in a particular forest site for purposes of economic improvement, social welfare, and improving environment.

Tenure rights must be a common concern, especially by the government who has the authority to give and to reform those rights. It is time that land reform which is still a discourse be given serious attention by the government if the government does not want more tragic criminality to occur because of on-site land dispute between parties in different locations. The government has accommodated public access to the forest, through the granting of forestry-based businesses such as village forest community (HD), plantations of the people (HTR), community forestry. In addition, the public is also granted access through partnerships between large-scale entrepreneurs and the people who have a micro enterprises and co-operatives. In the future this needed to continue to enhance the role of the public towards independence and well-being by providing a decent portion to expand its expertise in forest management.

### 2.7.1. Complete Land Conflict Resolution

Up to now land use conflicts and utilization of forest resources are still ongoing, and this will continue to happen if no complete settlement is found. It is very critical in some locations of forest plantations and can even create tensions because interest is not aligned with the boundaries of the status of forest management. This is due to a disagreement over who should control and manage the state forest and not infrequently leads to destructive actions (REDD + Task Force 2011). This situation must be improved to provide decisiveness in resolving conflicts between parties which is perpetually not being completed.

Clear authority and the absence of differences in interpretation of the definition and location of forests in Indonesia will reduce the fundamental differences about the role of control over forest resources by different actors and institutions. Conflicts over the role of control over land and forest resources caused by unclear tenure rights must be resolved with a serious effort through a proper strategy. The basic question is whether all parties to the conflict must be accommodated by giving that is not necessarily entitled to? Thus the question must be

answered by a careful investigation capabilities and protect those who actually have those rights.

### 2.7.2. Traditional Community Ought to Have Formal Right

Law No. 41 of 1999 on forestry stated that in addition to the state forests, there reside inside forests the right of indigenous people's rights and property rights. In the state forest area, property rights and indigenous rights are not allowed to exist, except through a process or procedure established through regulations set by the Ministry of Forestry. Procedures that allow them to have legal recognition as a society are very difficult and lengthy when dealing with the state forest. This condition should be corrected without prejudice to the rights of the people who has traditionally use forest land for cultivation.

Attention of government should be encouraged to allocate forests to be cultivated by traditional community through Village Forest (HD). Village governance must be able to reflect and realize the aspirations of the "law" that had existed before the customary system of state forest management existed. Although this is difficult, it should however continue to be pursued to achieve improvements to the business portion of the forestry sector to traditional community and/or village.

Maybe the problem will not arise if the indigenous peoples are given rights to land and forests which they acknowledged for generations based on traditional heritage. The existence of a formal customary right will not hamper the actions that aim to reduce GHG emissions and increase carbon stocks for carbon rights which are clearly explained. The absence of legal dualism on the recognition of customary rights of indigenous peoples in non-forest area and forest area becomes a solution in solving this tenure question. The existence of formal rights of indigenous peoples' is a reason for them to make decisions related to natural resources on ancestral lands that make their potential to contribute to oversee the forest for the better.

### 2.7.3. Livelihood and Adequacy of Alternative Source of Income

Forest is according to forest communities living in and around forests is to meet the livelihood needs of daily life. The local community is dependent to the forest as their environment, such as for fetching wood, non-wood, and other livelihood. When forests are cleared for other purposes, they lose their source of income they use to get from the forest. People usually will demand their rights if investors enter and clear the forest for their business purposes, such as establishing plantations or harvesting of wood from the natural forest.

Communities in and around forests face the problem of scarcity of alternative sources of income. In a very simple form, they made their life from what is generated from the forest and its ecosystem. Communities often do the clearing of forests by burning forest for shifting cultivation, about 1-2 hectares in accordance with the ability of the family. This is often blamed as the main problems of deforestation that degrade the forest. With rapid population growth, demand for land and natural resources will also increase. The absence of concern to them will result in damaged condition of the forest and further expand forest destruction.

Communities must be given adequate livelihood and income generation to support their families. Their habitual practices of earning their livelihood from the forests need to be

explored by the parties that will change this habit. Their involvement in the development process and/or investment in forestry is the key to the successful support of sustainable management of forest.

## 2.8. Support of International Funding in Climate Change Mitigation

Broadly speaking, the source of funding to carry out forest carbon activities can be divided into two sources (Boer et al., 2009), namely (1) carbon trading, whether the market is not open (non-open market) or open (open-market), and (2) bilateral or multilateral co-operation. Funding through the open market is not sourced from public funds such as CSR funds both nationally and internationally, or other public funds. The purpose of mitigation activities through the non-open market is not merely to decrease emissions and carbon trading, but also to support the award of compensation against a variety of activities that provide global benefits, such as biodiversity, climate change, existence of water reserves, etc. (APHI, 2011). Program developed by Bird Life for the restoration of natural production forest ecosystems and Inhutani together with Keep the Habitat entered into this category.

Funding through the open market are by means of voluntary market and mandatory markets such as the CDM. The purpose of this activity is especially to produce emission reduction certificate. Certification of emissions reductions generated through the voluntary market is called Verified Emission Reduction (VER) or Voluntary Carbon Unit (VCU), while the market through so-called mandatory CDM is called Certified Emission Reduction (CER). This certificate will become a commodity that can be traded. Some of the buyers of carbon services (VER / VCU and CER) were also interested as an investor, but the percentage is not high. Differences of VER/VCU and the CER is that VER can't be used by the state of the purchaser to be part of achieving emission reduction targets set under the Kyoto Protocol, while the CER can.

Sources of funding from bilateral and multilateral aid can take the form of funds or grants, soft loans and debt erasure over natural resources (Debt for Nature Swap, DNS). Currently, funding from World Bank that flows into Indonesia is used for the preparation phase to support the implementation of the REDD Demonstration Activity (DA), as well as investment funds aid. One of the multilateral fund to implement REDD activities and investments is FCPF (Forest Carbon Partnership Facility), and CIF (Climate Investment Fund). CIF is divided again into two: (1) Strategic Climate Fund (SCF) under which there is the Forest Investment Fund / Program (FIP) to support the implementation of REDD +, and (2) Clean Technology Fund (CTF) to support and develop activities/programs to decrease emissions or the use of low carbon emission technology. Bilateral funds offered to Indonesia to support the implementation of REDD + activities are also amply available from Germany (through KfW and GTZ through the Bureau of International Cooperation, Ministry of Forestry), Australia, and others.

Activities funded through the voluntary market as well as bilateral and multi-lateral grants, associated with the treatment of emission reduction credits that will be produced later is still unclear whether the payment can be done direct to the implementers of activities or have to pass the Central Government. According to regulation of the Minister of Forestry P.36/Menhut-II/2009, there are already existing rules relating to the distribution of payments, particularly from REDD activities through the voluntary market. However, REDD funds will

generally pass through the Central Government because the commitment of the REDD scheme and the success of emissions reductions from REDD activities were measured at the national level. Rules relating to the distribution of payments for carbon credits as well as monitoring systems, reporting and verification as well as the independent agency that will review the implementation of REDD+ activities was prepared by a special team appointed by the President under the coordination of UKP4.

To manage the funds from grants through bilateral cooperation for the implementation of climate change activities, the government of Indonesia has established the Indonesian Climate Change Trust Fund / ICCTF (Bappenas, 2009). ICCTF expected to play a role in managing the bilateral cooperation funds from various sources. In addition, the Ministry of Finance through the PIP (Government Investment Center) is also designing an institution to manage the bilateral cooperation funds to support investment in mitigation activities. This effort is consistent with what is mandated by the Regulation No. 1 of 2008 about the management of government investment funds to support the development of strategic sectors. The designed institute is to be called P.T. Indonesia Green Investment (Limited) which will act as operator and manager of private investment funds through the mechanism of private equity fund and collective investment contracts (Siregar, 2009 in APHI, 2010).

The patterns of funding to be discussed are the categories according to Payment Environmental Services (PES), Liability Rule (LR), and Purchasing Development Right (PDR). Various schemes are implemented in Indonesia such as REDD +, VCM, and A / R CDM, or other modification schemes which can be grouped by its category. In addition to these schemes there are schemes of the Debt for Natural Swap (DNS) which aimed to clear debts to foreign countries through actions that reduce GHG emissions, as well as the Upstream and Downstream Incentive scheme (UDI) to provide compensation or incentives to local upstream as to maintain the carbon and water regulation. This will be discussed in detail in Chapter 5.

## 2.9. Carbon Market Support

There are two types of carbon commodities traded in carbon markets. First is the carbon credits generated from the practice of limiting the level of emissions, known as cap-and-trade. Within this system, carbon credits generated due to the limitation level of emissions allowances for the state, or entities (e.g. companies) either voluntarily or mandatory because of established domestic regulations (government of a country) as well as international such as the Kyoto Protocol. Cap-and-trade system is adapted by the participants intended to internalize some of the cost of emission reduction so as to encourage the participants to obtain or develop an effective or cost-effective way in reducing emissions.

The second are carbon credits generated from the baseline-and-trade system that is sometimes called project-based system. In this system there are no restrictions on emissions, such as the cap-and-trade, and buyers of carbon credits recognized the emission reduction credits only if the seller can prove that the emission reductions would not occur without the emissions reductions through the project (referred to as additionality). Carbon credits purchased are generally used by buyers to offset their emissions so that they can become a

carbon-neutral entity or net emissions equal to zero or to meet their emission reduction targets.

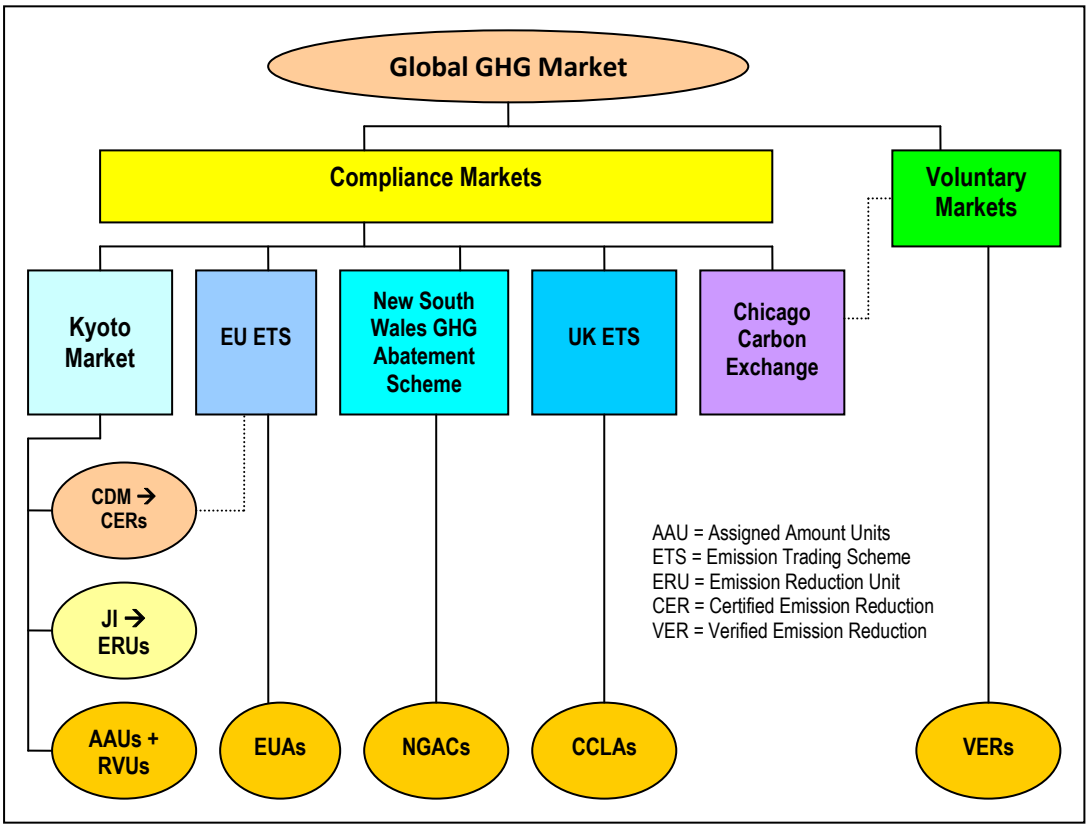



Figure 5. Market structure of global carbon

Figure 5 describes the global carbon market, consisting of mandatory carbon market (compliance market) and voluntary carbon markets (voluntary market). Kyoto market is mostly done by the industries with production process releases GHG emissions through the CDM, JI, AAU, and RVU. In addition, also sponsored by the EU-ETS. Meanwhile, the voluntary market was pioneered by the Chicago Carbon Exchange (CCX).

Figure 6 describes the carbon market through the mobilization of domestic funding. Mobilization of financing climate change mitigation in the National Action Plan for Improved Emissions and Maintenance of Forest Carbon Stock through the Sustainable Management of Forest can be reached through the funding of banks, non-banks, and CSR (SOE / S / D) of the domestic entrepreneurs or industries that emit GHG emissions. Funding of Pure Rupiah (RM) and Foreign Loan entered into in the State, while grant funds goes into the institution called the Trust Fund (TF), among others through the International Climate Change Trust Fund (ICCTF) and REDD+. The concept of CSR has not been implemented optimally by entrepreneurs in Indonesia in measures to internalize the costs related to social responsibility and corporate environments.

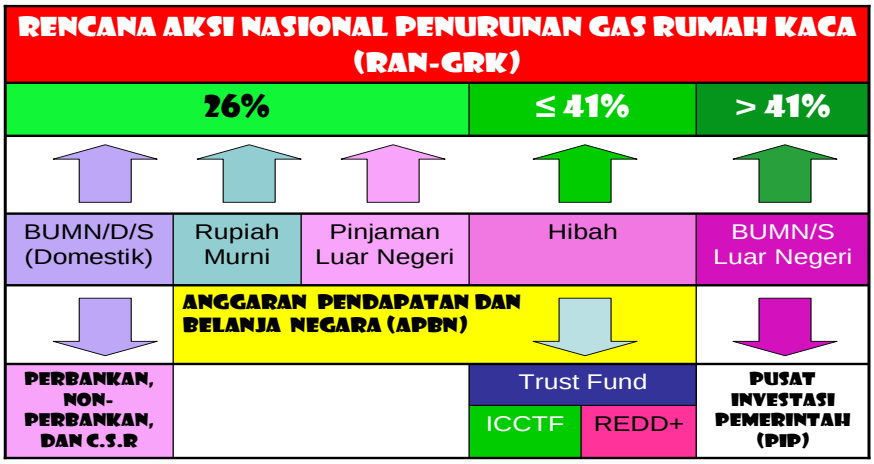



Figure 6. Potential Domestic Funding for Climate Change Mitigation

Domestic carbon market still does not exist, but its potential is very high through the mobilization of domestic funding to reduce GHG emissions without external aid (unilateral). All mobilization of domestic funding is directed to achieve the target of reduction of GHG emissions up by 26%. Through foreign support (funding and technology), Indonesia can contribute to the reduction of GHG emissions up to 41%. In addition, there is funding for carbon trading which is an investment and the mechanism is entered into the Government Investment Center (PIP) to contribute to reduce GHG emissions by more than 41%. In certain cases, foreign loans that should already be returned by the government should be proposed to be abolished (Debt for Natural Swap, 'DNS') through climate change mitigation schemes, such as through REDD +.

# SUCCESS IN SUPPRESSING RATE OF DEFORESTATION, FOREST DEGRADATION, AND INCREASE OF FOREST CARBON STOCK THROUGH THE SUSTAINED MANAGEMENT OF FOREST

# Bab 3

Each current forest conditions, especially production forests are under pressure by a variety of interests and causes deforestation[7] and forest degradation[8]. This happens not only in production, but also occurs in protected forest and forest conservation for a variety of interests outside the field of forestry, e.g. for the expansion of plantations, agricultural crops, mining, urban expansion and settlement, overlapping, land occupation and encroachment by enterprises or the public. Development of the last five years with the regional spatial revision in the provinces/districts /cities tends to reduce the forest area. Ministry of Forestry has provided directives on forest area for a particular function until the year 2030 (Table 2).

Tabel 2. Indicative area use in year 2030 (million hectare)

| Indicative/Plan | Cons. Area | Prot. Area | Area Function | | | Total |
|---|---|---|---|---|---|---|
| | | | Production Forest Area | | | |
| | | | Permanent | Limited | Conversion | |
| **Area for Conservation** | 23,20 | - | - | - | - | **23,20** |
| **Area for natural forest protection and peat lands** | - | 22,91 | 1,45 (+3,42) | 0,61 | To become Production Forest (HP) | **28,40** |
| **Area for rehabilitation** | 3,62 | 4,14 | 2,23 (+0,60) | 1,78 | 80% remaining to become HP | **11,55** |
| **Area for big scale forest enterprise** | - | - | 20,93 (+6,55) | 16,14 | 80% remaining to become HP | **43,62** |
| **Area for small scale forest enterprises** | - | 1,81 | 1,76 (+1,22) | 1,15 | 80% remaining to become HP | **5,57** |
| **Area for non-forestry** | - | - | - | - | | **18,34** |
| **Total** | 26,82 | 27,67 | 26,37 (+11,79) | 19,68 | - | |
| **Effective forest area** | **112,34 (85% of current total area)** | | | | | |

Source: National Level Forestry Planning (RKTN), 2010

Table 2 explain total forest area and non-forest area according to classification of land cover in Indonesia and predicted change due to current deforestation rate (Ministry of Forestry, 2009).

[7] Definition of deforestation is (a) changes in the function of forested areas permanently into non-forested (FAO and World Bank, 1996), or (b) differs from the definition used by NGOs, such as Green Peace (2007) that any change of forest cover is deforestation, even if done by people in small-scale farming (1-2 hectares). In the submission to SBSTA-25, Indonesia proposed definition (c) "Deforestation is the loss of forests due to human activities, including conversion of forest to other uses that have lower carbon stocks, forest loss and degradation resulting from the ongoing process as a result of recurrent fires and unsustainable timber harvesting."

[8] Forest degradation is generally defined as a decrease in tree density and / or increased degradation leading to loss of forest and other ecological services from forests. According to the FAO definition in Rizaldy Boer (2010) it is based on changes in the forest class (e.g. from closed forest to open forest) which has generally a negative effect on the forest stands or locations, and in particular, the lowering of production capacity.

Below are described some of the causes of deforestation and forest degradation that can eliminate or reduce the carbon stocks of forests, carbon sequestration and storage. Specifically addressed to deforestation, forest degradation, and increased carbon uptake in production forest that practice sustainable forest management.

Table 3. Emission, emission reduction, and forest carbon uptake through Sustainable Management of Forest in Indonesia in 2010 and cumulative 2010 – 2020

**x 1 Mill. t.$CO_2$e**

| No | Action | 26% (in year 2020) | 26% (Cumulative 2010 – 2020) |
|---|---|---|---|
| 1 | Emission Reduction: | | |
| | a. Eradication of *illegal logging* and *mining* | 0,195 | 1,965 |
| | b. Countermeasures on fire & forest encroachment | 0,072 | 0,920 |
| | c. Setting allowable cut (toward *carbon balance*) | 47,067 | 127,050 |
| | d. Emission prevention in HK, HL, HP, Non-Forest area | 73,015 | 173,015 |
| | **Total (1) Carbon Emission Reduction ( $CO_2$e )** | **120,349** | 302,945 |
| 2 | Carbon Uptake through PHL-HT & Land Rehabilitation | | |
| | a. Community Forest (HKm) = 3,03 mill Ha | 13,088 | 108,032 |
| | b. Village Forest (HD) = 2,48 mill Ha | 10,708 | 129,299 |
| | c. Land Rehabilitation /River Basin Forest = 3,55 mill Ha | 43,845 | 439,460 |
| | d. Industrial Forest Plantation (HTI) = 4,35 mill Ha | 109,753 | 693,270 |
| | e. People Forest Plantation (HTR) = 1,45 mill Ha | 36,584 | 234,864 |
| | g. People Forest (HR) & HR Partnership = 3,05 mill Ha | 21,951 | 140,559 |
| | **Total (2) Carbon Uptake ($CO_2$e)** | **235,929** | 1.706,458 |
| 3 | Carbon Uptake through PHL in Natural Forest | | |
| | a. Silviculture Intensive Technique (Silint) | 20,076 | 93,680 |
| | b. Indonesian Selective Cutting and Planting (TPTI) and *Reduced Impact Logging* (RIL) | 68,372 | 250,926 |
| | c. Ecosystem Restoration = 3,75 mill Ha | 21,475 | 198,815 |
| | d. Certification of Sustainable Forest Management | 15,781 | 77,860 |
| | **Total (3) Uptake ($CO_2$e) through Nat'l Forest PHPL** | **167,840** | 621,281 |
| 4 | **Total Emission Reduction & Carbon Uptake (1+2+3)** | **569,901** | 2.630,684 |
| 5 | **Emission on area release HL, HK, HP, and Non-For.** | **472,752** | **1.990,000*)** |
| 6 | **Total *Net Sink*/(*Net Emitter*) (4 – 5)** | **97,149** | **740,684** |
| 7 | **Target of Forest Emission Reduction & Peat Land** | **672,000** | **2.631,000** |

Source: Ministry of Forestry, 2009 (processed) and *) *Second National Communication* (2010).
To calculate carbon tonnage (ton C), divide figure of t.$CO_2$e by 3,67 (constant factor)

Table 3 above summarizes the action plan target to reduce emissions, increase carbon stocks and carbon uptake of forests through sustainable forest management in Indonesia. When compared with Indonesia's commitment to reduce emissions by 0.672 Gt.CO2e until 2020, then based on this analysis and emission reduction in forest carbon uptake through the PHL will account for 84.82% of that commitment. Target release into the forest area for non-forestry to 2030 area cover of 18.34 million hectares. But until the year 2020 it is estimated to reach only 4.8 million hectares (Ministry of Forestry, 2010) as among non-forest land it is still possible to serve as forest, such as a community forest, ecosystem restoration, forest highways, and other. In addition, about 2.6 million hectares of production forest has already been released that can be converted but where planting for plantations have not been done (Ministry of Forestry, 2010).

Tabel 4. Plan for GHG Emission Reduction in year 2020, cumulative 2010-2020, And in RAN-GHG (cumulative 2010-2020)

| Sector | Emission Reduction Plan (in year 2020) Giga ton $CO_2e$ | | Emission Reduction Plan (cumulative 2010-2020) Giga ton $CO_2e$ | Emission Reduction in RAN-GHG (cumulative 2010-2020) Giga ton $CO_2e$ |
|---|---|---|---|---|
| | 26% | 41% | 26% | |
| Forestry and peat land | 0,672 | 1,039 | 2,631 | 1,018 |
| Waste | 0,048 | 0,078 | 0,166 | 0,048 |
| Agriculture | 0,008 | 0,011 | 0,028 | 0,121 |
| Industry | 0,001 | 0,005 | 0,003 | 0,003 |
| Energy and Transport | 0,038 | 0,056 | 0,141 | 2,431 |
| Total | 0,767 | 1,189 | 2,969 | 3,622 |

Source: DNPI and REDD+ Task Force (2010)

Forestry is expected as the largest contributor to the national action plan reduction of greenhouse gas emissions (GHG-RAN), which amounted to 1.018 Gt.CO2e. Table 4 summarizes the emissions reduction plan in 2020 according to the commitment of 26% and 41%, cumulative years from 2010 to 2020, and the RAN-gas emissions.

## 3.1. Suppressing rate of Deforestation and Forest Degradation

During the period 2000-2005, the deforestation rate (changes in land cover / forest) in the forest and non-forest area reaches 1.2 million hectares per year. Report of the Working Group on Policy, Ministry of Forestry (2009), the rate of deforestation is planned for non-planting activities around 0.24 million hectares per year (21% of the total deforestation), while the unplanned reaches 0.43 million hectares per year (Ministry Forestry, 2010). Most of the deforestation is driven by the expansion of estate crop plantations and forest plantation for the production of wood pulp (pulp).

The expansion of agriculture for food production contributes little but the proportion is more important. If deforestation continues at the rate now, the forest will disappear from the non forest area in about 20 years and the production forest and forest conservation area in about 100 years (Table 5). Other estimates suggest that with the current rate of deforestation, all forest plantations is to use degraded forest areas.

Table 5. Classification of land cover by Ministry of Forestry Indonesia and predicted changes of current rate of deforestation.

| Area | Forest | Non-forest $10^6$ ha. | Total[a] | Deforestation rate 2003-2006 $10^3$ ha. per year | Relative annual deforestation % | Remaining forest until year 2020 $10^6$ ha. |
|---|---|---|---|---|---|---|
| **Forest Area** | | | | | | |
| • **Conservation** | **38,2** | **9,7** | **49,6** | **185,9** | **0,49** | **35,6** |
| • **Production** | **40,9** | **18,6** | **60,5** | **466,6** | **1,14** | **34,4** |
| • **Conversion** | **11,0** | **11,0** | **22,4** | **108,7** | **0,99** | **9,5** |
| Total | 90,1 | 39,3 | 132,4 | 761,2 | 0,84 | 79,4 |
| Non-Forest | 8,3 | 46,5 | 55,4 | 412,9 | 4,96 | 2,5 |
| General Total | 98,5 | 85,8 | 187,8 | 1174,1 | 1,19 | 82,0 |

a Discrepancies in total figures is caused by pixel that is blocked by cloud cover or unavailable data .
Source: Ministry of Forestry, 2009.

In contrast to the directives on area utilization in 2030 (Table 1) where the effective area of forest area becomes 112.34 million hectares while in the meantime, according to the study of land cover classification and change predicted by the current rate of deforestation, the remaining forest area in year 2020 will become 79.4 million hectares[9]. This difference is partly due to the pixel that is blocked by cloud cover or unavailable data. In addition, there are indications that the alleged conversion of forests into non-forest will be more than 80% as predicted by the Ministry of Forestry (2010). This condition is very likely to occur because of the rapid changes in regional autonomy trying to increase the growth of local revenue (PAD) by utilizing the natural resources of the region to the utmost.

### 3.1.1. Suppressing Rate of Deforestation in Conservation Area

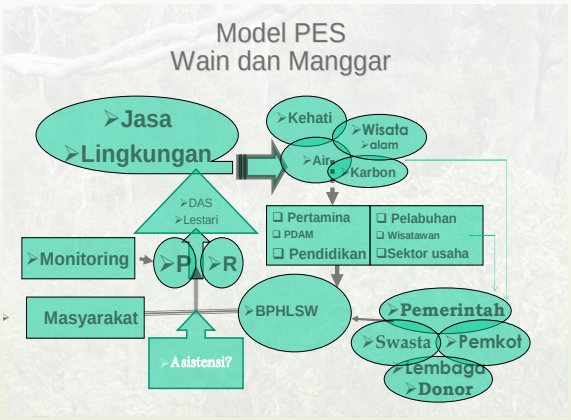
Ministry of Forestry (2010) have calculated the effective area / rationalization of forest area for conservation, the protection of natural forests and peat lands, areas for rehabilitation, forest areas for large and small enterprises, as well as to non-forest areas. Area for conservation, protection of natural forests and peat lands in Indonesia was 51.59 million hectares (see Table 3), the effective annual rate of deforestation in the region is about 0.49% based on the rate of deforestation in 2003 to 2006 (185.900 hectares per year) . The remaining forests in the conservation area up to 2020 is about 35.6 million hectares. In areas for conservation, protection of natural forests and peat lands, area available for rehabilitation covers 3.62 million ha. in forest conservation, and 3.32 million ha. in protected forests and 4.61 million ha. in production forest As an illustration of the potential use of environmental services to the pattern of Payment Environmental Services (PES) in protected forest as a conservation area can be followed in Box 1.

[9] Deforestation rate is based on data observation in year 2003 – 2006.

**BOX 1**

## Potential of Sungai Wain Protection Forest for Forest Carbon Stock Uptake, Storage, and Maintenance Through *Payment Environmental Service* Funding Pattern

Sungai Wain Protection Forest (HLSW) has unique characteristics, which among others it is located in the city area, a diversity of forest types with high biodiversity, is the catchment areas of raw water for the Pertamina refinery industry and the community of Balikpapan (East Kalimantan). Protected Forest (HL) has a primary function of the protection of soil/erosion control and water regulation (hydro-orology). In addition it possess the conservation and economic (non-timber and environmental services) functions.




Model *Payment Environmental Service* (PES) that can be developed at HLSW, are in the form of water services, tourism services, preservation of biodiversity, and carbon services.

Calculation of water potential and carbon services have been done. If priced with values stated below, then HLSW will be able to implement management without budget from the city government of Balikpapan (East Kalimantan).

Sungai Wain Protection Forest has produced a fair amount of environmental services for the City of Balikpapan, the Province, National and International. The benefits of water consumed by people around is as much as 47.24 m3 per day, number of 5,206 souls, and the need of 248,482.40 m3 per year. Value of water at Rp5,300 per m3 is Rp1.32 trillion per year. In addition to water used by the community, also utilized by Pertamina as much as 14,400 m3/day of water, using a total of 1,256,800 m3/year. Assuming the leakage of 1.5768 million m3 per year, then the value of the water that is used is 3.6792 million m3/year valued at Rp27.59 billion per year. Thus, the total economic value of water use by local communities and Pertamina is Rp28,910,956,720 / year.

Other benefits of services, namely its ability to store carbon as forest carbon stocks. With a total area of 8074 hectares HLSW consists of 3281 hectares of primary forest and 4793 hectares of secondary forest. Brown and Pearce (1994) calculate the amount of carbon in the primary forest as 283 tons of C (area 3281 ha), and in secondary forests as 194 ton C (4793 ha). Meanwhile, according to Scherr (2002), 300 tons of primary C / ha, and secondary logged over forest between 95-225 tons of C / ha. If the carbon price per ton is USD 10, then the primary forest has a value of Rp38, 83 billion, while the secondary forest Rp20, 49 billion. Thus, the total economic value of carbon stored is Rp 59, 32 billion.

Conservation function (conservation of protected forests and forests) is expected to protect biodiversity, prevent erosion and water system (hydro-orology function), as well as storing carbon. Protection of forest areas for conservation, protection of natural forests and peat lands is a government obligation to maintain and defend in accordance with the conservation and protection functions in order to prevent the possibility of a disaster that will engulf the region, such as the occurrence of landslides, floods, water crisis, forest fires, and microclimate[10] changes, and other disasters. Forest areas for conservation, protection of natural forests and peat lands would also be vital when forest area is able to maintain carbon stocks that is in the region.

Target of reducing emissions from deforestation in 2020 in a forest conservation area is estimated at 10.93 million t.$CO_2$e (1.7% of the total emission reduction for the release of the forest area). Compared to Table 5, relative to the annual deforestation rate of 0.49% of forest conservation (or decrease of its emissions by about 8.5 million t.$CO_2$e for the period from 2003 to 2006). Whereas in Table 6 it states that carbon emissions in 2009 (baseline) in the conservation area is 21.07 million t.$CO_2$e. Efforts to reduce carbon emissions by 10.93 million t.$CO_2$e is still lower than the 2009 baseline. This requires that forest conservation should be more guarded and preserved forest carbon stocks from deforestation action.

### 3.1.2. Suppressing Rate of Deforestation in Production Forest Area

Forest area for production purposes under the directive of the utilization of forest exist within the forest concession areas for large and small enterprises. Both aforementioned directives for production forest utilization is within the production forest area covering 59.08 million hectares (consisting of permanent production forest area of 36.74 million hectares and limited production forest area of 22.34 million hectares). These production forests are exploited for economic purposes including business permits for utilization of timber (IUPHHK) in natural forests (HA), plantations (HTI), plantations of the people (HTR), community forestry (HKm), and the forest villages (HD) . In addition, there are forests for people (HR) outside the forest area and the activities of Forest and Land Rehabilitation (RHL) that can be inside and outside the forest area.

Production forest area that has the permit to utilize wood from natural forest (IUPHHK-HA), reaches an area of 28.2 million ha. It is estimated that only about 15 million ha. (53.19 percent) implement the sustainable forest management system, while the rest do not. While the production forest area with no license covers an area of 20 million hectares and about 7 million hectares of this area has suffered severe degradation.

[10] Micro climate occurring in good forests, $CO_2$ in photosynthesis will be converted into wood, $O_2$ is released producing fresh air. Change in carbon sequestration ($CO_2$) and oxygen ($O_2$) release is due to deforestation and forest degradation, as well as no/less tree plantation or increase in vegetation coverage. Carbon storage which is emmited to the atmosphere is causing high C concentration in the atmosphere, thereby causing heat. If this occurs in entire earth, it will become global warming.

## BOX 2

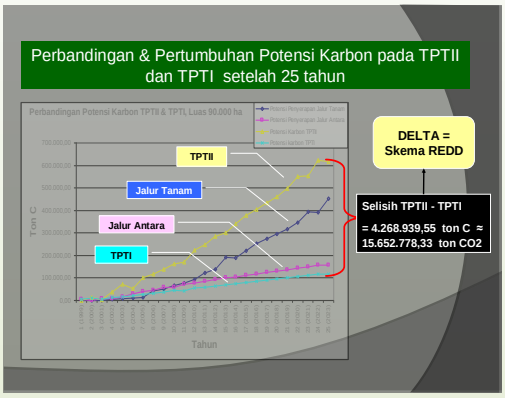
### REDD Practices at Sari Bumi Kusuma in Sustainable Forest Management and Results on its Observations, and Green Product

Observation was done for 25 years by P.T. Sari Bumi Kusuma (SBK) on deforestation and degradation of forest related to the *Reducing Emission from Deforestation and Degradation (REDD)* scheme. The area of observation is 90,000 hectare of planting and tending area with a result of carbon stock increment of 4,268,939.55 ton C ≈ 15,652,778.33 ton $CO_2e$. On the other hand, reduction of deforestation and degradation of forest in effort of overcoming shifting cultivation in an area of 81,425 hectare give result of 20,397,920.43 ton C ≈ 74,792,374.91 ton $CO_2e$. Therefore, in total 24,737,810.23 ton C ≈ 90,705,304.19 ton $CO_2e$.

Kapasitas Daya Dukung APL terhadap Degradasi dan Deforestasi dengan atau tanpa Sistem Pengelolaan TPTII dan Pembinaan Terpadu

| Sistem Pengelolaan Hutan | Kapasitas Daya Dukung Lahan Area Penggunaan Lain dari Adanya Deforestasi & Degradasi | | |
|---|---|---|---|
| | Tahun | DD (ha/thn) | Luas APL (ha) |
| TPTII dan Pembinaan PT. SBK & Pihak Lain | 64 | 400 | 25.600 |
| Tanpa TPTII maupun Pembinaan | 7 | 3.657 | 25.600 |
| Pengurangan Degradasi & Deforestasi dgn Sistem TPTII (ha) | 57 | 22.800 | 25.600 |
| Potensi Penyelamatan lahan/tahun | 1 | 3.257 | 25.600 |

Sumber: PT. Sari Bumi Kusuma & Hardiansyah (2010)




Forest management applying the Selective Cutting and Row Planting or TPTJ (or TPTI Intensive-Silint) reduced degradation and deforestation per year 3,257 hectare. Carrying capacity of land for other uses area (APL) from degradation and deforestation with TPTII or Silint is able to prevent actions that reduces carbon emission. Observation data from SBK shows that potential area with TPTII and development is only about 400 ha. / year, while without development it reaches 3,657 ha. /year.

With the belief that TPTI (Intensive) is able to increase carbon stocks, sustainable natural forest management practices ought to get an incentive (bonus) in the form of measures that reduce forest degradation. Other measures such as prevention of emissions from deforestation of forest fires, forest encroachment and illegal logging are not "absolute" to the company's liabilities, it is only logical they get the funds to reduce emissions, improve and maintain forest carbon stocks.

SBK will continue to manage the forests sustainably with wood as the main green product and Silint as a scheme of natural forest planting. The application of REDD + is hoped to replace the wooden equivalent of USD 25 per ton C. If less than the said value it means that the resulting carbon values is not equal to timber.

Natural forests that is sustainably managed and has received voluntary PHAPL are six units, while those with mandatory are 81 units. The low performance is due to the expensive management cost in order to qualify for acquisition of certificates and management has not felt the incentives after obtaining a certificate.

Forests that are managed through licenses, particularly in the production forests are under pressure by other sectors and regions, and communities for the purpose of non-forestry uses, subsistence, and other functions that can decrease the production forest and vegetation cover. This is what will increase the rate of deforestation and forest degradation on production forest. Effective annual rate of deforestation in the production forest is 1.14% of the rate of deforestation from 2003 to 2006 (466,000 hectares per year). The remaining forests up to 2020 approximately 34.4 million hectares, while according to the directive of forest area utilization in 2030 was still about 49.19 million hectares.

Target of reducing emissions from deforestation and / or degradation in 2020 in production forest totaled 212.62 million t.$CO_2$e (4.79% of total emission reduction for the release of the forest area). Compared to Table 5, relative to the annual deforestation rate of 1.14% of production forest (or only decreased its emissions by about 466.6 million per year t.$CO_2$e for the period from 2003 to 2006). Whereas Table 6 states that carbon emissions in 2009 in forest areas for large and small scale forest enterprises is 409.61 million t.$CO_2$e. Emission reduction actions in this area are still relatively small. This indicates a strong pressure of deforestation and forest degradation in the region. In addition, orientation in the management of production forests is prioritized on the economic aspects in addition to social and environmental aspects. Sustainable management practices of natural production forest are currently very limited due to the tremendous pressure from the interests of other uses outside the forestry sector. But the P.T. Sari Bumi Kusuma in West Kalimantan was able to show good performance (Box 2).

### 3.1.3. Suppressing Rate of Deforestation in Forest Area for Non-Forestry Uses

As a baseline scenario, all area for non-forest uses which are still heavily forested will be converted and released within the next 15 years, covering an area of 18.34 million hectares in accordance with RKTN 2011-2030 (Ministry of Forestry, 2011). HPK in forested area of 22.74 million hectares (16.61% of the total forest area) is actually only 10.27 million hectares under forest cover. Although there is a HPK provided for other uses areas (APL) that has been planned, but the fact shows that unplanned deforestation still occurs, at a rate of about 0.86 million hectares per year. Effective annual rate of deforestation is 0.99% of the rate of deforestation from 2003 to 2006 (108,700 ha per year). Converted production forest area remaining in year 2020 is estimated be approximately 9.5 million hectares. Ministry of Forestry (2011) has allocated the forest that could be converted up to 2030 for other uses covering an area of 18.34 million hectares.

Until 2025, unplanned deforestation and forest degradation is predicted around 8.77 million hectares, which include the result of illegal plantations, mining, logging, or urban expansion that is not in accordance with the spatial planning of the district / city, as well as

settlements where the land was originally forested then become permanently bare of forest. Also, several other activities in forest areas which is done by permit holders of timber utilization (IUPHHK) themselves and by sector, region, or society has degraded forests and characterized by decreased function of vegetation cover.

Target of reducing emissions from deforestation and / or degradation in 2020 in a production forest that can be converted will reach 416.23 million t.$CO_2$e (61.94% of the total emission reduction for the release of the forest area). Compared to Table 5, the annual deforestation rate relative to non-forest area of 412.9 million t.$CO_2$e (annual deforestation rates relative to the period from 2003 to 2006 is 0.99%). Table 6 states that carbon emissions in 2009 (base year) in non-forest area to reach 801.86 million t.$CO_2$e. Carbon emission reduction targets in this area is very small because the area is converted into non-forestry purposes. However, the area is also still possible to be used as a forest (HD / HAD, HR, and RE).

### 3.1.4. Suppressing Critical Land in Indonesia

Area of degraded land in Indonesia is very large and in desperate need of rehabilitation. Approximately 41% of forest area in Indonesia (77.8 million hectares) is in a degraded state (the Ministry of Forestry)[11]. Degraded land can be categorized as being somewhat critical, critical and very critical (Fig. 4). Statistical data for critical and very critical land is available up to 2006 and showed that approximately 35% of it is located in the forest area (Ministry of Forestry, 2009). Therefore, a large proportion of 'degradation' in addition to deforestation is occuring outside of areas managed by the Ministry of Forestry.

Classification of critical land needs to be reviewed if spatial planning will be carried out carefully, especially in areas outside the forest area. This is because the classification is based on the volume of the forest stand, most of the land used productively for other uses by people is classified as degraded (Verchot et al., 2010). In addition, the definition of ecosystem function has a different threshold in terms of loss of vegetation. Therefore, the validity of the assumed correlation between the volume of the forest stand and ecosystem function for all parts of the country is still not clear. Planning for the expansion of planting area on land designated as marginal lands by the Ministry of Forestry and outside forest area should take into account various activities such as impact on local communities and indigenous peoples.

However, to avoid conversion of forest to other growing areas remain important because most of the 22 million hectares of land reserved for development of new growing areas by the Ministry of Forestry is forested lands. This makes the category of land use as a target for investment will increase national emissions of carbon and a high carbon deficit in the coming decades. Under the directives of forest land use, the area for rehabilitation of all functions of forests amounted to 11.55 million hectares. If coupled with non-forest area covering 18.6 million hectares, the total will amount to 30.15 million hectares will become critical or degraded land and should be restored back to forest and its function as a carbon sink.

[11] According to the Ministry of Forestry, degraded land is land that has been severely damaged due to the loss of vegetation cover and which have lost most of its ecosystem functions, including erosion control, water storage, nutrient cycling, micro-climate regulation and carbon storage of forests.

The target to suppress the occurrence of critical land and degraded forests (deforestation and forest degradation) in order to reduce GHG emissions from these actions, it is planned that by 2020 the entire forest area will reach 73.0 million t.$CO_2$e (or 9.1 million per year t.$CO_2$e, or 6, 6% of the total forest carbon emission reduction). Compared to Table 6, the carbon emissions that occurred in 2009 (base year) reached 10.72 million t.$CO_2$e. The target to suppress critical lands or reduce carbon emissions by 9.1 million t.$CO_2$e the area for forest and land rehabilitation is relatively stable per year.

## 3.2. Increase of Forest Carbon Stock Through Plantation

Ekadinata (2010) estimates that with the current rate of deforestation all forest area will disappear within the next 50 years. One way to avoid this consequence is to continue expansion of agricultural land and plantation forests by the use of critical forest land for new planting area. Planting woody species will ensure the increase of the uptake of carbon dioxide ($CO_2$) from the air which is then accumulated in tree biomass into forest carbon stocks.

In addition, to increase the uptake of carbon in natural forests, improving the productivity of forest land through intensive silviculture technique (silint) should be done as a new policy of the Ministry of Forestry (2006). Data of the planting / enrichment planting of natural forests through silvicultural systems are lacking making it difficult to predict the magnitude of carbon emission and the increase of carbon uptake during tree felling.

### 3.2.1. Increase of Forest Carbon Stock in Industrial Forest Plantation

The main forest plantations in Indonesia are industrial forests with acacia trees (Acacia mangium and A. crasicarpa) and eucalyptus (Eucalyptus pellita), primarily for wood pulp. More than 75% HTI permit issued by the Ministry of Forestry is for pulpwood plantations (HTI-pulp). These plantations are generally managed by using a short rotation of 6-7 years. Indonesia has around 9.1 million hectares of forest plantation (IUPHHK SK-HT), or only 7% of the total area classified as forest. Realization of the plant area at HTI to 2010 is approximately 4.2 million hectares (Ministry of Forestry, 2010) or 46% for almost 25 years since the 1984 introduction of HTI, although there are subsidies for reforestation and plantation development (Barr et al., 2010) . The delay in the achievement of these targets is partly due to pressure from various parties for non-forestry activities.

Ministry of Forestry aims to expand the area of 5 million hectares of HTI up to the year 2016, or to about 14.1 million hectares (60% effective area, so only about 8.5 million hectares), and to about 20 million hectares in 2030 (effectively about 18 million hectares) (Road Map, 2010). Given the production of wood pulp that is currently dependent on harvesting fiber from natural forests, this increase will adequately provide the wood pulp industry with the need of fiber from plantations and will allow increased capacity of the industry (Ministry of Forestry,

2011)[12]. However, this data is doubted by some because of weak reporting system which is the responsibility of the HTI company management.

**BOX 3**

**Potential of Industrial Forest Plantations as Carbon Sink to Increase Forest Carbon Stock and Community Welfare**

Industrial Forest Plantation (HTI) is a good example as an adequately high carbon sink. P.T. Wira Karya Sakti (WKS) manage a plantation area of 293,812 hectares (SK. 346/2004 of the Minister of Forestry), but based on GIS mapping the area is 313,671 hectares, comprising of 35,680 hectares of conservation area, other use areas (infra-structure, settlements, fields, and other etc.) covering 71,783 hectares, and an area of 206,208 hectares that can be planted.

Until year 2010 area planted is 197,720 hectares. Growth of acacia (Acacia mangium) and eucalypts (Eucalyptus pellita) with Mean Annual Increment (MAI) of 25-35 m3/ha/year in mineral soil, and Acacia crasicarpa for 17-25 m3/ha/ year in wet soils (wetland). Carbon uptake potential of plants with class age> 5 years is about 8.8974 million tons of C ≈ 32,653,458 tons of $CO_2e$. Investment costs for the three types of plants are in the range of USD 1,000-1,500 per hectare.

Forest carbon storage potential of a conservation area of 35,680 hectare is approx-imately 3.18444 million tons of C ≈ 11,686,895 tons of $CO_2e$. In the area of cultivation by local communities and indigenous people carried out with partnership through planting of Acacia mangium and Eucalyptus pellita species, and Corporate Social Responsibility (CSR) with rubber (Hevea brasiliensis) and other non-timber produce such as honey bee, fish, rattan, and bamboo.

The concept of additionality in HTI development is community development, prevention of forest fire and forest encroachment, construction of infrastructure (roads, places of worship, education, health, etc.) as part of corporate strategy for the development of HTI. The high cost ought to get proper incentive scheme funding of climate change mitigation, such as REDD +, non-REDD +, or A / R CDM. A fee of USD 1000-1500 per hectare, including for community development is still considered too high, where the fair cost according to HTI feasibility study is approximately $ 1,000 per hectare. Thus, the incentives should be given to the plantation manager who runs the program is $ 500 per hectare, or approximately USD 1.0 to 1.5 per ton C. These funds are used to improve the welfare of local communities and indigenous people that exist in and around the HTI plantation, as well as maintenance efforts of forest carbon stocks in existing conservation areas in the IUPHHK-HT area.

[12] In anticipation of increasing demand of raw wood material for wood pulp by HTI, in response of the current Ministry of Forestry plan to construct new 12 wood pulp mill, with a new total production of 8 million ton wood pulp.

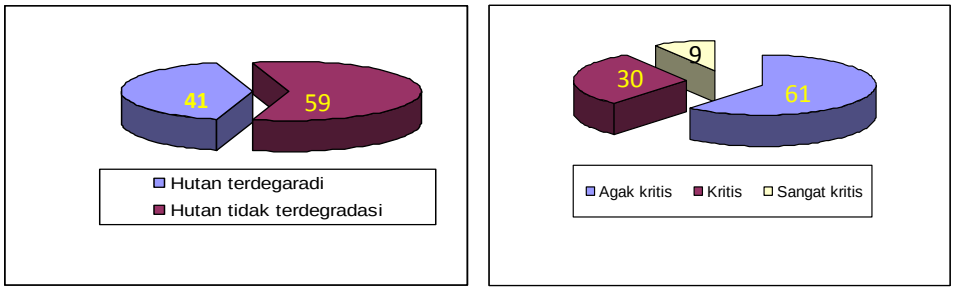



Figure 7. Proportion of land cover and degraded land compared to total land area in Indonesia (Ministry of Forestry, 2009 in Verchot 2010)

(*Hutan terdegradasi* = degraded forest; *Hutan tidak terdegradasi* = Non degraded forest; *Agak kritis* = slightly critical; *Kritis* = Critical; *Sangat kritis* = Very critical)

The rate of development of forest plantations under the expected rate seems to be difficult to achieve the targets set for HTI by year 2016 and even 2030. To achieve an additional effective 8.5 million hectares, 425,000 hectares must be planted each year in areas largely derived from the natural forest clearing. However, recent policy of the Ministry of Forestry requires the cultivation of plantations in degraded areas, so it will be increasingly difficult to achieve those targets. Figures for current and projected HTI development achievements as well as data on the development of HTI is still doubted by some parties (World Bank, 2006). Doubts over the accuracy of the data on rate of planting is to be addressed before planning a tree planting program as a climate change mitigation strategy.

Allegations by international NGO that HTI is not a forest plantation because forest plantations changes the function of many natural forests which eliminates the main biodiversity, has no strong enough reason. The potential for carbon uptake on the plantation is still below 200 t.$CO_2$e (Center for Policy Research & Development and Climate Change, Ministry of Forestry, 2010). However, efforts to regenerate the degraded areas for HTI should be appreciated and should be considered for incentive funding of climate change mitigation. Projections of changes in the management of plantations is not only to meet the needs of pulp and paper industry (pulp) and the integration of products of wood, as well as to develop environmentally friendly products (green products) in the form of wood pellets and liquid (bio-energy) as a fuel substitute of bio-fuel. Box 3 above shows that the HTI in WKS is able to absorb carbon in large enough quantities.

Target to increase the uptake of carbon through the action of planting in HTI in 2020 was 109.75 million t.$CO_2$e (or cumulative from 2010 to 2020 amounting to 693.270 million t.$CO_2$e, or 37.04% of the total increase in carbon stocks through the act of planting). Table 7 states that forest carbon uptake occurring in 2009 (base year) on forest area for large and small scale forest enterprises reached 787.77 million t.$CO_2$e for the entire effort of planting schemes on various plantations (HTI, HTR, HD, HKm , HR and HR Partnership, and rehabilitation of land / forest).

With increasing cumulative forest carbon at 218.75 million tons of C, then every year HTI should be able to plant about 365,733 hectares. While the target of the Ministry of Forestry for HTI planting each year is 425,000 hectares to reach the effective area of 13.35 million ha by

2020. Increase in timber volume growth per hectare per year (Mean Annual Increment-MAI) of about 17-35 m3/hectare /year, or C ≈ 8.8974 million tons of 32,653,458 tons of $CO_2e$. While forest carbon storage potential of an area of 35,680 hectare conservation area is approximately 3.18444 million tons of C ≈ 11,686,895 tons $CO_2e$.

### 3.2.2. Increase of Forest Carbon Stock in Natural Forest

Especially for natural production forest, enrichment planting can be done and by the Indonesian Selective Logging and Planting (TPTI) silvicultural systems or Intensive Indonesian Selective Cutting and Planting (TPTII) through intensive silviculture techniques (Silint), or Selective Cutting and Line Planting (TPTJ). Data on enrichment or planting in the natural production forests are not available because report received by the Ministry of Forestry is not well accumulated. This is due to the poor and stagnant flow of information and data from the Provincial and District Forestry offices to the Ministry of Forestry – there are barriers in the reporting hierarchy and authority.

Realization of enrichment planting in natural forests has reached 281 367 hectares through the TPTI and TPTJ silvicultural systems in the past 5 years, or approximately 56,273 hectares per year (APHI, 2010). While the planting through Silint technique in the past 5 years reached 89,127 hectares of meranti group crop (Shorea leprosula, S. parvifolia, S. johoriensis, S. platiclados, and Parashorea sp) with a 25-year crop cycle, or about 17,825 hectares per year (APHI, 2010). In practice, Silint still in the stage of field tests, with newly allocated area for 28 units of IUPHHK-HA in Indonesia. The delay in enrichment planting or planting with intensive silviculture techniques at several locations of IUPHHK-HA hampers the development of GHG mitigation programs, especially in natural forest.

In addition to enrichment planting in natural forests through silvicultural systems mentioned above, many of the land in IUPHHK-HA is degraded or damaged due to encroachment, illegal logging, fires, and excessive logging. Decrease in the number of IUPHHK-HA unit from 525 in the 1990's to 243 units in 2010 (APHI, 2010), indicates the pressure on land use change on natural forests is also great. The degraded area of natural forests should be given priority for restoration through planting and or enrichment planting. The results showed that the natural forest through Silint technique is able to absorb carbon by more than 73.27 million t.$C0_2e$ (R & D and Climate Change Policy, Ministry of Forestry 2009). The enhancement of forest carbon stocks through enrichment planting with species of the Dipterocarpaceae family reached 250.926 million t.$CO_2e$.

Target to increase the uptake of carbon through the action of planting in the natural forest planting reaches 146.345 million t.$CO_2e$ (cumulative from 2010 to 2020 amounting to 621.821 million t.$CO_2e$, or 23.62% of the total increase in uptake of carbon through forest management actions on the natural forest). Thus, increase of the cumulative forest carbon stocks is 169.290 million tons of C. Table 6 shows that the proportion of natural forests which is 23.62% of the total increase in carbon in large scale forest enterprises, the stock of carbon is 46.330 million tons of C (base year). So, in 2020 the forest carbon stocks through these actions becomes 205.620 million tons of C.

Therefore, it is expected that with SFM in natural forests with Silint or TPTJ, TPTI forest management systems, and application of RIL is able to plant about 252,710 hectares per year. In line with the Ministry of Forestry planting targets through Silint, TPTI / TPTJ, and RIL which is equal to 250,000 hectares per year, then what should be done is to keep natural forest to the maximum extent to avoid deforestation or excessive degradation.

### 3.2.3. Increase of Forest Carbon Stock in People Forest Plantation

People Forest Plantation (HTR) aims to revive traditional wood processing sectors that produce plywood and sawn timber. HTR is also developed to provide raw materials for pulp (van Noordwijk et al., 2007 in Verchot 2010). In 2016, the Ministry of Forestry reserve an area covering 5.4 million hectares for HTR in all corners of Indonesia (Kustiawan, 2007). Based on 1.2 million hectares targeted for development of HTR during the period 2007 to 2009, until now only 383.403 hectares is realized as IUPHHK-HTR (area back-up through Decision of the Minister of Forestry). This is caused partly by lack of adequate economic profitability and various restrictions on land use. This indicates that the wood pulp plantations are not aligned with the goals of community development in rural areas.

Reforestation program carried out exclusively by the Ministry of Forestry, for sure the reforestation would occur within the production forest area. Government programs based on this HTR to provide opportunity and access to the community at large to participate in the forest enterprise through business license. The hope is that there will be less public pressure on existing forest having a license, in addition to improving their welfare. Allocation area for HTR should be in the degraded production forest areas, while critical land in Indonesia is located in the countryside outside the forest area. Therefore, the HTR is predicted to be difficult to develop compared to HTI. The aim to empower agro-forestry and other economically viable planting activities become constrained.

HTR is a relatively new program and there are no growth data for modeling the potential to contribute to emission reductions. Because of the limited technical capabilities and cost support, and its dependency on receiving technical guidance from the government, the growth of HTR tend to be smaller than the HTI. Therefore, it is natural that the contribution of HTR in emission reductions would be smaller than the HTI.

Target to increase of carbon uptake through the action of planting in the HTR reached 21.950 million t.$CO_2$e (cumulative from 2010 to 2020 amounting to 140.559 million t.$CO_2$e, or 8.24% of the total increase in carbon uptake through planting). With the increase in forest carbon stocks at 5.981 million tons of C or cumulative of 38.300 million tons of C. Table 6 shows that the proportion of HTR is 30% of the stock of 5.538 million tons of carbon into C (base year), then the total stock of carbon with the addition of the HTR becomes 43.838 million tons C in 2020. Therefore, action through HTR scheme should plant about 61.280 hectares annually.

While the targets of the Ministry of Forestry for HTI planting each year is 200,000 hectares cover an area of 3.5 million hectares in 2020[13]. Therefore, it should be actively encouraged by the various policies in favor of the people in order to improve the welfare of small-scale forestry.

### 3.2.4. Increase of Forest Carbon Stock in Community Forest and Village Forest

Community Forests (HKm) and Village Forest (HD) have still very few achieve-ments (less than 10% of the total area back-up in 2010 which is 55,078 hectares). HKm and HD can be found inside and outside the forest area, where HKm is preferred for the collection of non-timber forest produce. If the purpose is for timber product, IUPHHK- HKm must be filed, as well as HD which was originally has a village forest management rights (HPH-D) from the Ministry of Forestry.

HKm progress is very slow because of limitations of profit and economic feasibility. In general, HKm is developed for several purposes, namely for non-timber forest produce like rattan, gaharu, jelutung, and ironwood in the conservation area, whether on the plantation and/or natural forests. HKm managers who produce wood have up to now shows no growth, so there is no data that can provide the potential contribution of emission reductions from HKm. Usually development of HKm is integrated with model development of protected forest management, forest conservation and production forests. Thus, the calculation of forest carbon rights must take into consideration the existence of the community according to its proportion.

Meanwhile, the village forest management rights (HPH-D) is also not much developed. Ministry of Forestry is implementing a policy of village forest management rights that can potentially replace the Indigenous Rights management. It is considered the clarity of responsibility, governance and administrative structure of the village.

Target to increase the uptake of carbon through the planting activities in HKm and HD in 2020 reached 23.796 million t.$CO_2$e (cumulative from 2010 to 2020 amounting to 237.331 million t.$CO_2$e, or 9.25% of total uptake of carbon through the activities of planting). Thus, the cumulative increase in forest carbon stocks through HD and HKm amounted to 64.670 million tons of C. If according to Table 6 (base year) activities of planting on HKm and HD has a proportion of 20%, then the forest carbon stocks in both areas was 22.330 million tons of C. So, by 2020 there will be a carbon stock of 85,000 million tons of C.

Therefore, the act of planting on both these schemes should reach 103,427 hectares per year, consisting of 46,562 hectares in HD and approximately 56,910 hectares for HKm.

[13] Realization of People Forest Plantation (HTR) by 2010 is only about 90,414.89 hectares for about five years (in accordance with the permission of regents / governors), but its area has been reserved by the Minister of Forestry, covering 631,628 hectares.

While investment targets in HD and HKm from the Ministry of Forestry is 350,000 hectares per year to become 3.5 million hectares in 2020[14].

### 3.2.5. Increase of Forest Carbon Stock in People Forest

Meanwhile, the People Forest (HR) which is outside the working area of forest (Areas for Other Uses, APL), has been much developed in Java. In addition to the fertile soil, species like sengon (Paraserianthes falcataria), mahogany (Swietenia macrophylla), jabon (Anthocepalus cadamba), and sungkai (Peronema canescens) has been known for a long time by communities in Java.

Various attractive schemes are offered by investors to grow jabon, increasing the amount of land area planted with this species by communities. Until now, almost 640,000 hectares of land on the island of Java were planted with these well known timber species by the people for the last ten years. It seem likely that in the future, developments of HR will dominate in parallel with the increasing demand of wood for wood processing industry, especially in the island of Java. Meanwhile, outside the island of Java, HR is still growing because people outside of the island of Java prefer to plant rubber compared to planting trees for its timber.

People Forests in Java island will continue to expand along with increasing demand for wood to meet the needs of wood produced by the people for use in the plywood mill and sawn timber. Some species mentioned above have been known to grow so that the model should also be known to contribute to cut its emissions. Development of HR in Java island can reach 60,000 hectares per year (Directorate General of Planning, Ministry of Forestry 2010).

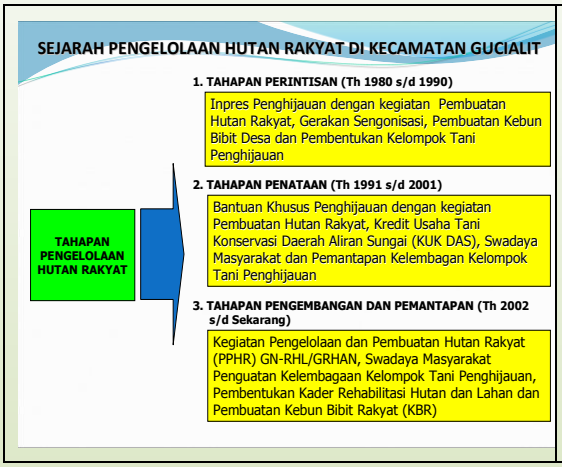
Research result by Siregar (2010) in Sukabumi (West Java) and Kediri (East Java) for the sengon species (Paraserianthes falcataria), shows that the species having diameter from 5.5 to 35.5 cm absorb $CO_2$ as much as 0.139 tons / tree, with the potential of biomass of 0.076 tons / tree. Carbon stocks above ground for people forest growing African wood species (Maesopsis sp) in the villages, the carbon potential of stands is between 15.56 to 194.97 ton C / ha, and the species of mahogany (Swietenia sp) as much as 17.33 ton C / ha . While the village forests for teak species (Tectona grandis) has a carbon reserve of 49.00 tons C / ha. The example in Box 4 shows that the management of public forests in the district on a small scale at Gucialit, Lumajang (East Java) can absorb enough carbon. Awards (incentive) funding should be provided to the HR manager to keep interested in planting which in turn will generate economic (wood) and environmental (carbon sequestration services) benefits.

[14] Realization of HKm and HD in an area of 40,795.55 hectares (permission of regents / governors), comprising of 30,485.55 hectares for HKm and area of 10,310.00 hectares for HD over the next five years.

## BOX 4

### People Forest in Sub-District Gucialit as a Model of Small Scale Sustainable Forest Management in Support of Climate Change Mitigation

People Forest (HR) in Sub-District Gucialit, Lumajang, East Java has an area of 3,427.11 ha (4,471 ha based on the indicative area) with 7,472 Head of Households (HH), in 8 villages, namely: Wonokerto, Pakel, Kenongo, Dadapan, Kertowono, Tunjung, Jeruk, and Sombo. HR has a PHBML Certificate from the Indonesia Ecolabelling Institute (LEI) in 2010 which is valid for 15 years. Virtue of certification is intended to (1) promote sustainable forest management in CBFM, (2) encourage the development of the forest outside the forest area, (3) promote social equity and a better system in forest management, and (4) encourage the trade of green products and carbon sequestration.




The HR is developed on former secondary forest and neglected dry agriculture land. Number of trees totals 2.029.986 with estimated stand volume of 197.219,95 $m^3$ (or carbon stock of around 98.610 ton C ≈ 361.899 t.$CO_2$e) since year 1980.

With that amount of carbon and if valued as a minimum of USD 15/ton C, then community will receive around Rp 138. 670.280/year or (Rp18.560/month/HH) during the eight year cycle.

Certification process was explored based on note of understanding between PERSEPSI, Center for Standardization and Environment – Ministry of Forestry, East Java Provincial Forestry Office, and the Regent of Lumajang. Consideration to chose Sub-District Gucialit area to get the HR certificate are (1) condition of canopy closure of woody plants is relatively close, (2) stands of the same species are available in ample quantity, especially sengon species (*Paraserianthes falcataria*), mahogany (*Swietenia macrophylla*), and teak (*Tectona grandis*), (3) social economic condition of the communities is relatively the same with well develop sense of cooperation amongst communities, and (4) a geographic condition which form a unity of overlay.

The target to increase the uptake of carbon through the planting activities on HR and HR Partnership reached 21.951 million t.$CO_2$e (cumulative from 2010 to 2020 amounting to 140.559 million t.$CO_2$e, or 8.24% of total uptake of carbon through planting activities). Thus, the enhancement of forest carbon stocks through HR and HR Partnership scheme amounted to 38.299 million tons of C. Table 6 shows that the forest area in 2009 (base year) are able to absorb carbon as much as 33.874 million t.$CO_2$e or a stock of 9.230 million tons of carbon C. So, by 2020 the forest carbon stocks in HR forest area amounted to 47.529 million tons of C.

Therefore, each year it is expected to plant in HR and HR Partnership approximately 87, 680 hectares. While the target of planting HR and HR Partnership each year is 152,500 hectares to be increased until 3.05 million hectares in 2020[15]. This is quite difficult to achieve due to HR has not been widely developed outside the island of Java.

### 3.2.6. Increase of Forest Carbon Stock in Forest and Land Rehabilitation

As for forest and land rehabilitation activities, working area can be inside and outside the forest area. The realization of RHL is through program of forest and land rehabilitation movement (GERHAN) and the national movement of forest and land rehabilitation (GNRHL) which has reached in 2011 an area of 4.8 million hectares (Ministry of Forestry 2011). Models of tree growth in GNRHL program have not been reported and therefore contribution of emission reduction could not be predicted as yet. This movement is almost similar to the action of the villagers in planting in community forests. Thus, the potential of existing carbon stock in several location is similar to village forest.

Activity has been well received internationally as an international issue of global climate change. The activity is the answer to lowering carbon emissions through climate change mitigation in particular carbon sequestration, through planting timber species as vegetation cover. The GNRHL action program will be more meaningful if it is really done on critical lands spread all over the villages in Indonesia. Therefore, the national emission reduction targets can partly be contributed to this movement. However, whether the distribution of benefit of the mechanism of carbon sequestration resulting in negative degradation of planting on marginal lands produces financial incentives internationally? This should get international recognition after the measurement, reporting, and verification (MRV) by an independent body.

However, GHRHL as an action in the mitigation of climate change is a real evidence of Indonesia's commitment to reduce emissions even without international assistance. Improvements to be done to enhance the quality of future emissions reductions through a variety of schemes to mitigate climate change, among others are (1) mapping the exact area of degraded or critical land, (2) superior plant species is chosen that produce more carbon uptake, (3) the need for incentives to the perpetrators of the tree growers, and (4) institutional arrangement responsible for the success of this movement. Therefore, good coordination should be established between government agencies, communities and seed providers in the area.

Target to increase forest carbon uptake through the action of planting on land and forest rehabilitation reaches 43.845 million t.CO2e (cumulative from 2010 to 2020 amounting to 290,911 million t.CO2e, or 17.05% of the total uptake of carbon through the action of planting). Thus, the cumulative increase in forest carbon stocks through land and forest rehabilitation measures amounted to 79.270 million tons of C. Table 6 shows that the rehabilitation of land and forest in 2009 (base year) are able to absorb as much as 82.795

[15] People Forest (HR) find development in the island of Java until it reaches more than 1 million hectare (Ministry of Forestry 2010), while outside the island of Java it is very few, except Partnership HR estimated to cover an area of 315,000 hectare until year 2020

million t.CO2e carbon or 22.560 million tons C. So, by 2020 the forest carbon stocks in forest and land rehabilitation amounted to 101.830 million tons of C.

Therefore, each year through forest and land rehabilitation measures it is expected to plant an area of 126,828 hectares. While HD and HKm investment targets of the Ministry of Forestry is 350,000 hectares per year to reach an area of 3.5 million hectares in 2020. Therefore, like other planting program, forest and land rehabilitation measures must also be increased from year to year.

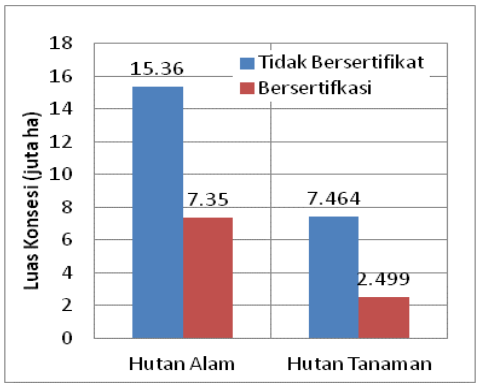
## 3.3. Encouraging Certification of Sustainable Forest Management

Good forest management practices based on silvicultural systems regulated through Permenhut Number P.30/Menhut-II/2005, dated October 13, 2005, on the Standard System of Natural Forests Silviculture on Dry Land and / or Wet Natural Forest Land / Swamp. Performance assessment of sustainable forest management (IUPHHK-HA, HTI, HTR, HKm, HR, and RE) is regulated by the Minister of Forestry regulation No. P.38/Menhut-II/2009 on Standards and Performance Assessment of Sustainable Production Forest Management and Timber Legality Verification on Permit Holders or Forest with Forest Rights. It is followed by the Regulation of the Directorate General of Forestry Production Development Regulations (BPK) Number P.06/VI-Set/2009 on Standards and Performance Assessment of Sustainable Production Forest Management and Timber Legality Verification jo Regulation of BPK Director General No. P.2/VI-Set/2010 of about guidelines for Assessment of Sustainable Production Forest Management and Timber Legality Verification (SFM and VLK). Standards and assessments are used to assess the performance of unit managers before receiving certificate that is mandatory from the Ministry of Forestry[16]. While a voluntary assessment of PHL have been made, which is developed by LEI and FSC. PHL performance appraisal was assessed by an independent agency that has the competency and accredited by the Office of National Accreditation (KAN).

APHI (2011) reported that there were 102 unit HA-IUPHHK who graduated with a total area of 9,759,445 hectares and has a mandatory SFM certificate from the Ministry of Forestry, and as many as 58 units or an area of 6,234,534 hectares who did not pass. In addition there are 4 HA units of LEI / FSC, 2 HA units of the FSC, and 2 units of HTI from LEI that received SFM volunteer certificate with a total area of 1,106,231 hectares. Status of voluntary certification of SFM that uses standard LEI Indonesia, 'LEI', Forest Stewardship Council, 'FSC', and others are not regulated / recognized specifically[17] by equalizing the performance.

[16] Since 2002 up to and including 2006, 103 units of sustainable natural production forest management (PHAPL) are evaluated for the purpose of certification, however, only 55 units with a total area of 5.7 ha received new certificate of extension: while 27 units are rejected/not extended, and one unit postponed. For management unit that have received PHAPL mandatory certificate, an incentive is given in the form of *self approval* of Annual Work Plan (RKT) with allowable cut commensurate with its real capability. In addition to evaluating the 103 management units, there are 41 who submit application for new permit (26 unit are accepted and 15 units rejected).

[17] No Natural Forest Management Unit received voluntary PHAPL certificate as well as from LEI, while there are nine units from FSC (1 million hectare). But for PHTL (Sustainable Forest Plantation) especially from LEI there are two units (112,000 hectare), while from PHBML for Community Forestry (KM) there are 16 units (25,793 hectares) consisting of 4 units from FSC and 12 units from LEI.




Peringkat Sertifikasi untuk IUPHHK-HA:
(1) Baik-Sangat Baik = 22%
(2) Sedang = 25%
(3) Buruk = 53%

Peringkat Sertifikasi untuk IUPHHK-HT semuanya masuk peringkat baik

Sumber: Direktorat Jenderal Bina Usaha Kehutanan, Kementerian Kehutanan (2011)

Figure 8. Certification of sustainable forest management

PHTL certificate for voluntary HTI has not shown marked improvement. Since 2010 there are 2 new PHTL plantation units with volunteer certificate from LEI. While the FSC was "reluctant" to verify the performance of HTI as it is considered that the current management of plantations is generally done by first opening of natural forests to plantations, although there are among the plantation unit that only work in the area covered with shrub, vacant land, and lalang fields . However, some of the plantation is located in one group with another company where forest clearing for HTI is done by opening remaining natural forests. The double standard adopted by FSC is very detrimental to forest managers who actually worked by the rules and regulations.

Certification for Community Forestry (KM) or with other names, namely with the term of community-based forest management (CBFM), consisting of HTR, HD, HKm, and HR do not use the mandatory certification but use the voluntary instead. There are already numerous application from KM and have received community based certificate of sustainable forest management (PHBML). Until now, no one with HTR units inside the state forest PHTL has obtained certificate, whether mandatory or voluntary because it was newly built. If HTR is required to obtain the PHTL mandatory certificate, cost consideration must be taken into account because there has been no thorough study of business and financial feasibility of HTR. Another scheme that is similar to the HTR is HR, but HR management is outside the forest area.

HR Unit Management in Indonesia that has received voluntary certification for sustainable forest management amounts to 16 units (in an area of 25,793 hektar), consisting of four HTR unit HR (723 hektar) which have received certificate from FSC and 12 units from LEI (25,070 hektar). This HR can later be directed to receive incentive in funding climate change mitigation (for example from: REDD+, A/R CDM, and Voluntary Carbon Market, 'VCM').

Other schemes, one unit of HKm has received PHMBL certificate, while none has received HPH-D, except for one unit of traditional forest in the village of Sungai Utik with protection function at West Kalimantan.

Both of these schemes have its own uniqueness where the HKm was initially directed only to get non-wood produce, while the HD obtained the permission of the management license (not utilization).If HKm want to apply for the utilization of timber, it must go through a legal HKm entity, a cooperatives for non-wood produce after five years of operation. Forest Village may submit utilization of timber from natural forests (with IUPHHK-HA) or through the development of forest plantation (IUPHHK-HT).

Based on certification schemes or forest management mentioned above, it implies positively on the increase in carbon stocks and emissions reduction from deforestation and forest degradation. Increase in carbon stocks is done through the framework of the absorption (Rap) and storage (Pan) of forest carbon, while the framework for preventing GHG emissions is done through avoiding changes in vegetation cover from deforestation and forest degradation.

REDD + has in fact adopted the framework. Further movement of REDD + in the future could adopt the A / R is in the Kyoto Protocol, but there is still no clear agreement between parties in the Conference of Parties COP) under the UNFCCC. On the other hand, LULUCF (Land Use, Land Use Change, and Forestry) and the commitment to first stage Kyoto Protocol's until 2012. In the UNFCCC COP-17 meeting in Durban 2011, CDM schemes of the Kyoto Protocol remains the world's attention, especially from the European Union.

Therefore, understanding the framework of the mitigation of climate change will have implications on the progress of implementation in each country. The provisions of international conventions will also be encouraged with certainty and a clear footing and at the same time in an effort to set standards of performance assessment of each action to mitigate climate change.

Based on the data that has been taken into account by the Ministry of Forestry in the program for the strategic plan of REDD +, the contribution of the reduction of emissions from the process of certification of sustainable forest management gained about 15,781 million tons of $CO_2$-e. The role of certification of sustainable forest management (SFM) is to make a better functioning of forests to absorb and store forest carbon. Thus, it cumulatively increase forest carbon stocks through SFM certification action.

In order to achieve certification for the entire management unit (large-scale and small-scale forestry enterprises, as well as management of forest conservation and protected areas) in 2020, it was time for forestry enterprises to get special treatment because of the heavy task to manage the three aspects (economic / production, social, and the environment) that need high costs. Therefore, service incentives, tax breaks, abolition of high economic cost and the eradication of illegal levies, and the creation of a conducive business and investment climate in the forestry sector and should really be a patron of forestry.

Standards of performance assessment of SFM mentioned above is for production forests (mandatory in PHL and VLK from the Ministry of Forestry, and voluntary from LEI and FSC) are still not adapted to the climate change mitigation schemes. However, these standards can be a tool for assessing the performance of sustainable forest management, simply add more detailed criteria and indicators for the environmental aspects related to climate change mitigation. Especially for performance assessment standards in the management of conservation and protected forests, there is a need to publish the standards.

Target of increasing forest carbon uptake by the year 2020 (cumulative from 2010 to 2020) through action to achieve SFM certification reaches 77,860 million t.$CO_2$e or 12.53% of the total uptake of carbon through the PHL action). Thus, the cumulative increase in forest carbon stocks through this action amounted to 21.215 million tons of C. Table 6 shows that the same percentage, then in 2009 (baseline) in the areas for large and small forest enterprises has 13,990 million tons of carbon stock C. So, by 2020 the forest carbon stocks in this action amounted to 35,205 million tons of C. It seems that the increase in carbon stocks are not too significant, it should be encouragement and incentive for forest entrepreneurs in obtaining a PHL certificate.

## 3.4. Increase of Forest Carbon Stock

The measure for forest carbon stocks increase is calculated based on the sum of all activities or actions on Table 4 that increases carbon uptake in forest areas into six directives for specific functions (Table 6). Uptake of atmospheric carbon stored in wood biomass can be measured by standardized rules (Pustanling, Ministry of Forestry, 2011).

The increase in carbon stocks are based on year 2009 (base year) with a range of actions performed in the land area for conservation, protection of natural forests and peat lands, rehabilitation of degraded forests, large and small scale forestry enterprises, and areas for non-forestry. This last land area is an area that is allocated by the Ministry of Forestry for activities outside the field of forestry, such as for farming, agriculture, urban expansion, transmigration, and others.

Table 6 shows that the highest increase in forest carbon stocks in occurred in the first place in areas for large-scale forest enterprises, with an increase in carbon stocks to 841,82 million t.$CO_2$e. This large-scale forest enterprise is managed by a company which holds IUPHHK-HA, HTI, and RE. The second occurs in forest areas for forest and land rehabilitation, amounting to 439,46 million t.$CO_2$e. The third, it occurs in forest areas for small-scale forest enterprises amounting to 378,92 million t.$CO_2$e. However, carbon stocks of the largest to the smallest magnitude is found in the area for large-scale enterprise, area for protection of natural forests and peat lands, and conservation areas (see Table 6).

Table 6. Increase of forest carbon stock in year 2020 and cumulative in year 2010 – 2020 in accordance with forest area directive.

| Tabel 6. Perubahan Stok Karbon Tahun 2010 – 2020 melalui Pengelolaan yang lestari Hutan Indonesia | | | | |
|---|---|---|---|---|
| No | Tindakan | Base year 2009 | Peningkatan 2010 – 2020 | Stok Karbon 2020 |
| | | ---------- Juta t.$CO_2$e ---------- | | |
| 1 | Konservasi | 3.645,10 | 152,61 | 3.797,71 |
| 2 | Perlindungan HA dan lahan gambut | 5.596,43 | 257,84 | 5.854,27 |
| 3 | Rehabilitasi lahan/htn | 498,68 | 439,46 | 938,14 |
| 4 | Pengusahaan hutan skala besar | 9.034,03 | 841,82 | 10.783,84 |
| 5 | Pengusahaan hutan skala kecil | 503,56 | 378,92 | 882.48 |
| 6 | Non-kehutanan | 6.156,84 | 560,03 | 6.716,83 |

## 3.5. Role of Forest Management Unit (KPH) in Sustainable Forest Management (SFM)

Among the many problems faced by the forestry sector is the high deforestation and forest degradation; encroachment of forest area done by people around the forest and plantation companies on site who have the leasehold on the surrounding forests; extensive critical land that need to be rehabilitated; and handling of forest resource management issues that have not been comprehensively done. Problems are very likely to happen, because even if property rights are guaranteed by the State Forest by law[13] but it is in fact vulnerable to open access resources, where the parties who are willing to take risks will be competing for access. As a result forest resource will be depleted and destroyed without any party willing to take responsibility for damage or deterioration such forest resource function.

To suppress the negative effects of state control commensurate with its characteristics which is prone to these open access resources, then the presence of responsible manager at the site level is very much needed. There are many options on how to bring the manager at the site level, but under the rules and regulations at this time of development, Forest Management Unit (KPH) development is the most probable alternative.

As it is known that REDD + is a funding mechanism to support the implementation of environmental services through terrestrial carbon through international negotiations in order to reduce emissions from deforestation and forest degradation through a series of sustainable forest management activities and enhancement of forest carbon stocks in developing countries. With this scheme, in essence the scope of activities that can be developed include lowering the levels of deforestation and forest degradation; increase carbon stocks through land cover and forest improvements, and maintaining existing carbon stocks through

sustainable forest management. Such activities will not be able to be done if no party is responsible for the success of its implementation, namely in terms of planning, including negotiations and financing framework, implementation, guaranteeing the security and sustainability of investments, reduce the impact of negative control of forest areas by the state with characteristics that are appropriate prone to be open access, prevention of leakages for the implementation of REDD +, performance measurement and reporting of emission reduction and an increase in carbon stocks, following up on the weaknesses of the implementation, management cost and distribution of benefits at the site level. Therefore, providing management at the site, which can carry out the activities is very much needed. In the framework of existing regulations and law, site manager can be played by KPH, especially for the implementation of REDD + based on forest areas.

Forest Management Unit or abbreviated KPH, is a forest management area according to the principal functions and purposes, which can be managed efficiently and sustainably (PP No.6/2007 jo PP. 3/2008). The term KPH itself has been known since the issuance of Law No. 41/1999 on Forestry, later reaffirmed in the PP. 44 of 2004 on Forestry Planning and received strong encouragement through PP no. 6 of 2007 jo PP no. 3 year 2008 regarding Forest Management, Forest Management Planning, and Forest Utilization. But long before that the management of forests in the island of Java by the state forest corporation Perum Perhutani the term KPH is already familiar, meaning the Forest Management Unit or KPH.

The urgency of KPH development especially outside the island of Java is driven by the fact that:

a. Forest areas is by law controlled by the state, require intensive asset management at site level and represent the government at the site.

b. Management (especially the utilization of forest resources) which is entrusted to the private sector through the mechanism of issuance of forest utilization permit (IUPHH) has a time limit and if it has ended, the area has no manager anymore. Moreover, the transfer of right given to the permit holder is temporary in nature (similar to a lease), a tight control is needed by the government about the behavior of permit holder.

c. There are many forest investments such as forest rehabilitation (Gerhan) which is already implemented in the field experiences failure because of the absence of manager for the investment. Project implementation is oriented only to planting, without thinking about tending the planted trees.

d. Programs of providing access to communities to have an active participation in forest management like in People Forest Plantation, Village Forest, and Community Forest are slow in its realization because there is no cohort at the implementation level.

Considering the adequately strategic position, KPH need to be given amply extensive duty and function. The duty and function covers as follow, as stated in government regulation PP No. 6/2007 jo PP No. 3/2008:

a. Organized forest management and forest governance including forest spatial planning, the preparation of forest management plans; forest utilization; use of forests area; forest rehabilitation and reclamation, and forest protection and nature conservation

b. Spell out national forestry policy outlines and provincial and district /municipal level to be implemented at the site level.

c. Actuate forest management in its region beginning with planning, organizing, implementation, monitoring and control.

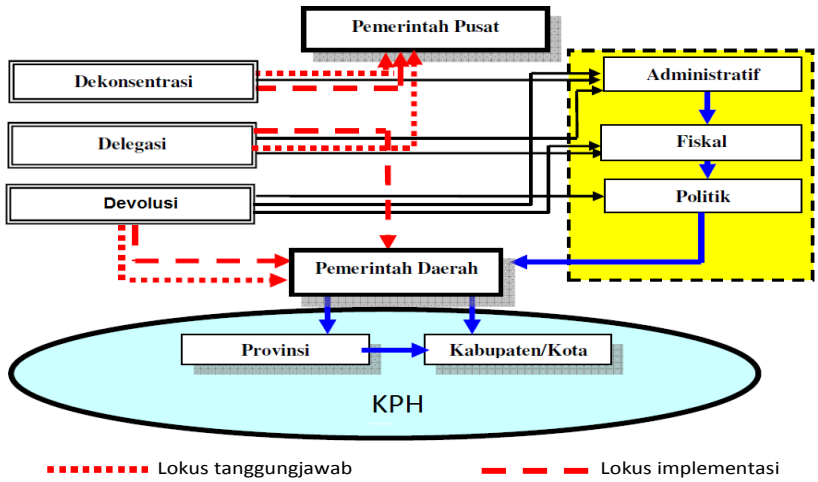
d. Monitor and evaluate implementation of activities of forest management in its area.

e. Opening investment opportunities to support the achievement of forest management goals.

It is obvious that synchronizing the said duty and function will be in harmony with the characteristic of REDD+ framework. Adaptation is primarily needed in measurement and reporting of performance in lowering emmission and increasing carbon stock.

Administratively, the organization and staffing of KPH is under regional authority (Governor, Regent /Mayor) in accordance with their authority and territorial limits. KPH can be divided into Production (KPHP), Protection (KPHL), and Conservation (KPHK) entities, depending on which functions are most dominant. Thus, within the KPH there could exist protected forests and /or conservation area. Or, in the forest there can exist KPHK production and /or protected forest, so within KPHL there can exist production forest and forest conservation.

Up to now there are 60 unit of KPH model in 25 provinces in Indonesia (Ministry of Forestry, 2011). It is planned that in year 2014 there will be 120 KPH units. In the meantime, the formation of the KPH model is facilitated by the government (Central), it ought to be the provinces and districts that take the initiative to form KPH because of its decentralized nature. Basis of KPH formation is River Catchment Area (DAS), and not administrative area. Because of it, one KPH can have an area crossing administrative district and provincial borders.




Sumber: Boer, 2011

Figure 9. Distribution options in authority and scope of decentralization

For forest planning that are within its territory, KPH is obliged to prepare a forest management pattern as a basis for the preparation of forest management plans for the management units within the KPH. At the provincial level, in the preparation of forest

management plans (RPPH) at the KPH which area crosses district borders a strategy shall be formulated to manage the forest according to the characteristic of the watershed (DAS) covering two or more districts. While RPPH at the district level, the strategy formulated is in accordance with DAS or KPH which is located within the district. RPPH in this case is similar with RKU (General Work Plan) which are usually compiled by the KPH company.

RPPH mentioned above, in addition to containing the substance of the utilization of timber in the production forest, it contain the uses of area in each forest function as well. The said management planning system is intended to be more integrated and reflect characteristics of each area. Similarly, for a plan with a variety of environmental services with various schemes (A / R CDM, VCM, or REDD +). KPH can serve to make the planning of forest management scheme within its KPH, which of course there will be IUPHHK-HA, HTI, HTR, and HKm management units. There is also a RPPH for the management of HK and HL, unless the KPH is specifically for KPH at the provincial or even national level.

Therefore, if the KPH is immediately formed, the first step that must be performed include (1) determination of the KPH, (2) the establishment of the organization and officers in charge, (3) forest inventories in the region, and (4) develop RPPH. RPPH is prepared for a period of 20 years, made by officials at the KPH, and every 10 (ten) years evaluated by the Comprehensive Periodic Forest Inventory (IHMB). Furthermore, each is coordinated by the Head of KPH, located in the province, among others, filed RKU authorities to obtain approval of the Governor. After RPPH is prepared and approved by the Governor, then each set of KPH Work Plan and Budget in each year as an annual work plan.

Functional relationship with the forestry department at the provincial and district / city is organized as follows:

a. Provincial, District /City forest service serves as the administrator of the area associated with the affairs of governance (governance in forestry administration, supervision, control, and licensing of forestry);
b. KPH (could be in the form of the Regional Technical Implementation Unit) serves as the unit manager of the planning, organizing, and implementing forest development unit, including the administration of timber and forest sustainability appraisal as an institution;
c. Unit manager (Company) serves as the executor of the utilization of forest products, and / or forest areas.

The function of KPH is to manage the area according to the region under its management, the KPH-L managing protection forests, KPH-K to manage the forest conservation and KPH-P manages the production forest. KPH system follows the system of area domination, as an example, one KPH-P can have a protected area or area of forest conservation, but not dominant in one area of the forest, as well as KPH-L and / or KPH-K could also have a production forest. KPH can also perform the duties of government, such as Gerhan, forest development, and other tasks. While the unit manager (IUPHH and IUPJL) perform the functions for the utilization of forest products companies and /or forest land for a particular effort to obtain appropriate licenses. Mechanism of action of agencies which deal with forestry, KPH, and unit managers will be discussed in other sections by a national consultant of ITTO project PD 007/09 Rev.2 (F), particularly associated with an increase in carbon stocks through SFM for REDD +.

In Action Plans on Reduction of Greenhouse Gas (GHG RAN) which has become a Presidential Regulation No. 61 In 2011, the role of the above KPH become dominant, especially for managing the forest on site. KPH serves as agent of development for the Government because it bear the burden of the mission of the entire hierarchy of forest management in Indonesia. At the level of REL / RL (Reference Emission Level / Reference Level) at sub-national level, the role of KPH is increasingly dominant as the lead forest manager.

# Bab 4 BASE YEAR RESERVE, EMISSION AND FOREST CARBON UPTAKE IN SUSTAINABLE MANAGEMENT OF FOREST

The calculation of net emission for base year business as usual (BAU) for the sustainable management for each forest function is data / information without intervention of future mitigation. BAU base-year, especially in the forest sector that should be known are emissions of greenhouse gases (GHGs), reserves, and forest carbon uptake at any given time. The goal is to create a profile of GHG emissions level in forestry and peat land at the national level and its projection in a long period of time (from year 2010 to 2020).

For that purpose, calculation is done on the amount of emissions produced from a field / activity based on historical data (inventory of GHG emissions), reserves and forest carbon uptake and data / information without any projection of future policy interventions / technologies to mitigate climate change within the period from 2010 to 2020 (Ministry of Forestry, 2010).

Climate change mitigation actions is formulated by identifying the GHG emission reduction activities in the GHG RAN forestry and peat lands document, particularly on sustainable management of forest in Indonesia. GHG emission reduction activities that have been identified, including the identification of programs and activities that already exist (existing actions) contained in the document of national strategic development plan for the forestry and associated peat lands. Also, similar mitigation activities of the private and public activities can be added, especially in sustainably managed forests with focus on the large and small scale businesses in forestry.

## 4.1. Forest Carbon Reserve

Forest carbon stocks are calculated according to the above-ground biomass changes outside the peat land and APL. Table 7 summarizes the number of carbon stocks in forest land from 2000 through 2011. Calculation of carbon stocks is based on multiplication of emission factor and activity data. Activity data is obtained from land cover change on land cover classes (23 classes).

Table 7 shows that the total forest carbon stock declined from year to year with an average rate of decline of 0.11% per year. Especially in large-scale forest enterprises carbon stocks decline is quite large with an average rate of 0.57% per year. While the small-scale forestry enterprise, the rate of decline in forest carbon stocks is even greater, at around 0.70%. For non-forested area, the decline is smaller than the decline in reserves that occurred on large scale forest enterprises, which is only 0.52%. This possibly occurs because of changes in land cover from forest conversion activities after it is converted to estate crop plantations or other vegetation cover.

Tabel 7. *Above ground biomass* outside peat lands from year 2000 – 2011 **x 1 mill.**

| Area Function | Year | | | | |
|---|---|---|---|---|---|
| | 2000 | 2003 | 2006 | 2009 | 2011 |
| Area for conservation | 3.715,50 | 3.698,87 | 3.662,86 | 3.645,10 | 3.639,57 |
| Area for natural forest protection and peat lands | 5.724,38 | 5.700,17 | 5.631,87 | 5.596,43 | 5.580,90 |
| Area for forest and land rehabilitation | 518,89 | 514,78 | 506,53 | 501,40 | 498,68 |
| Area for large scale forest enterprise | 9.531,53 | 9.406,44 | 9.187,10 | 9.034,03 | 9.942,02 |
| Area for small scale forest enterprise | 532,06 | 534,05 | 515,24 | 503,56 | 492,37 |
| Area for non-forestry | 6.592,76 | 6.471,99 | 6.322,07 | 6.156,84 | 4.973,70 |
| C (ton) | 26.615,12 | 26.326,30 | 25.825,67 | 25.437.36 | 25.127,24 |
| $CO_2e$ total | 97.677,49 | 96.617,52 | 94.780,19 | 93.780,12 | 92.216,98 |

Source: Directorate General of Planning, Ministry of Forestry (2011), modified.

## 4.2. Greenhouse Gas Emission from Forest Carbon

Carbon emissions from forests or forest carbon emissions are calculated based on changes in above-ground biomass outside the peat lands. Table 8 summarizes the carbon emissions of outside peat land for years 2000 to 2009. Calculation of carbon obtained from carbon stock reduction the previous year to current year (e.g. 2000-2003 emissions is calculated from subtraction of from carbon stock in 2000 from carbon stocks in 2003).

Table8. Forest carbon emission (*above ground biomass*) outside peat lands in year 2000 – 2009 **x 1 mill.**

| Forest Area Function | Year | | | |
|---|---|---|---|---|
| | 2000 | 2003 | 2006 | 2009 |
| Area for conservation | 17,22 | 47,87 | 28,11 | 5,74 |
| Area for natural forest protection and peat lands | 24,97 | 73,06 | 44,68 | 16,91 |
| Area for forest and land rehabilitation | 4,33 | 9,10 | 6,59 | 2,92 |
| Area for large scale forest enterprise | 137,63 | 243,15 | 197,36 | 101,96 |
| Area for small scale forest enterprise | 9,43 | 16,43 | 15,97 | 9,65 |
| Area for non-forestry | 118,68 | 213,35 | 239,93 | 218,49 |
| C (ton) | 312,26 | 602,96 | 532,63 | 355,67 |
| $CO_2e$ total | 1.145,98 | 2.212,86 | 1.954,76 | 1.305,29 |
| $CO_2e$ per year | 318,99 | 737,62 | 651,59 | 435,10 |

Source: Directorate General of Planning, Ministry of Forestry (2012), modified.

Table 8 shows that from 2000 to 2003 the rate of forest carbon emissions ($CO_2e$) increased by an annual average of 32%, whereas since the year 2003 to 2009 there is average annual decline of 13%. Especially for large-scale forestry enterprises, the rate of carbon emissions that occurred between the years 2000 - 2003 increased by an average annual rate of 25.56%, while the years 2003 to 2009 the is an average annual decline of 11.19%. Thus, the target reduction of GHG emissions from the forestry sector which are 14% of the 26% national target is realistic to be implemented by 2020. Effort or action needs to be done to decrease the rate of emissions each year through various activities.

## 4.3. Forest Carbon Uptake

Forest carbon uptake was calculated according to the above-ground biomass changes outside of peat lands. Table 9 summarizes the number of carbon uptake by the forest from 2000 to 2009. Calculation of carbon uptake is obtained from the addition of carbon stocks in each land cover class. Forest carbon uptake was also calculated from secondary forests that continue to grow and absorb carbon.

Table 9. Forest carbon uptake (*above ground biomass*) outside of peat lands from year 2000 – 2009

**x1 mill.**

| Forest Function | Year | | | |
|---|---|---|---|---|
| | 2000 | 2003 | 2006 | 2009 |
| Area for conservation | 39,83 | 48,15 | 52,41 | 29,40 |
| Area for natural forest protection and peat lands | 72,73 | 75,21 | 84,69 | 53,42 |
| Area for forest and land rehabilitation | 29,04 | 31,44 | 34,80 | 22,56 |
| Area for large scale forest enterprise | 248,46 | 250,16 | 304,73 | 196,19 |
| Area for small scale forest enterprise | 24,45 | 26,72 | 26,72 | 18.46 |
| Kawasan untuk non-kehutanan | 266,56 | 304,58 | 306,88 | 188,99 |
| C (ton) | 678,69 | 733,99 | 810,23 | 509,02 |
| $CO_2e$ total | 2.490,80 | 2.693,73 | 2.973,53 | 1.868,12 |
| $CO_2e$ per year | 830,27 | 897,91 | 991,18 | 622,71 |

Source: Directorate General of Planning, Ministry of Forestry (2012), modified.

Table 9 shows that the total forest carbon uptake increased from 2000 to 2006 with an average rate of increase per year of 3.14%, whereas from 2006 to 2009 there is a quite drastic decrease of about 11.68% per year. Especially in large-scale forest enterprises, forest carbon uptake increased from the year 2003 - 2006 with an average rate per year of 3.29% per year, whereas in the year 2006 to 2009 there is a decline of 11.35% per year. For small-scale forest enterprise, there is a rate of increase in carbon uptake of about 3.34% per year in the years 2003 to 2006, and a decline in the years 2006 to 2009 in forest carbon uptake of about 10.30% per year.

For non-forest area there is an increase of forest carbon uptake of between 2003 - 2006 which is around 2.12%, whereas in the years 2006 to 2009 a decline in forest carbon uptake of about 10.96%. In line with the increase / decrease in forest carbon stocks on the non-forest area, forest carbon uptake decreased between 2006 - 2009 as a result of a slower pace of planting in this region compared to the rate of forest conversion to plantations or other uses of land.

## 4.4. Balance in Carbon Sink (*Net Sink/Balance*)

Table 7 and Table 8 shows that the condition of balance between forest carbon uptake and emissions until 2009 shows Indonesia as a net sink (not a net emitter). It means that

Indonesia is not a country of carbon forests emitters for nine years (2000 - 2009) because forest carbon uptake is higher than forest carbon emissions.

Table 10. Condition of forest carbon uptake and emission outside of peat land, including Non-forest area and area for other uses (APL), 2000 – 2009.

**x mill. ton $CO_2e$**

| Condition | 2000 | 2003 | 2006 | 2009 |
|---|---|---|---|---|
| Forest carbon uptake | 2,490.80 | 2,693.73 | 2,973.53 | 1,868.12 |
| Forest carbon emission | 1,145.98 | 2,212.86 | 1,954.76 | 1,305.29 |
| *Net Sink/(Net Emitter)* | 1,344.82 | 480.87 | 1,018.77 | 562.83 |

Source: Directorate General of Planning, Ministry of Forestry (2011), modified

Table 7 and Table 8 figures do not include non forest area, its calculation is only for within forest area (not including peat lands), it still shows *net sink*. Table 11 shows that lowest *net sink* occurred in year 2003 and the highest in year 2000.

Table 11. Condition of forest carbon uptake and emission within forest area outside peat lands, 2000 – 2009.

**x mill. ton $CO_2e$**

| Condition | 2000 | 2003 | 2006 | 2009 |
|---|---|---|---|---|
| Forest carbon uptake within forest area | 1,512.53 | 1,575.92 | 1,847.28 | 1,174.51 |
| Forest carbon emission within forest area | 710.42 | 1,429.87 | 1,074.23 | 503.45 |
| *Net sink/(net emitter)* | 802.10 | 146.05 | 773.05 | 671.06 |
| Absolute difference (%) | 40.36 | 69.63 | 24.12 | 19.23 |

Source: Directorate General of Planning, Ministry of Forestry (2011), modified.

Therefore, these conditions must be kept by maintaining carbon stocks and increase forest carbon uptake, both inside and outside the forest area. Differences in net sink in year 2000 - 2009 between inside forest area and total net sink (Table 10) is large enough, i.e. consecutively 542,72; 334,81; 245,72, and 108,24 million tons of $CO_2e$, or 38% in average.

Table 12. Condition of forest carbon uptake and emission outside forest area, 2000 – 2009

**x mill. ton $CO_2e$**

| Condition | 2000 | 2003 | 2006 | 2009 |
|---|---|---|---|---|
| Forest carbon uptake outside forest area | 978,28 | 1.117,81 | 1.126.25 | 693.61 |
| Forest carbon emission outside forest area | 435,56 | 782,99 | 880.53 | 801.84 |
| *Net Sink/(Net Emitter)* | 542,72 | 334,81 | 245,72 | (108,24) |
| *Net sink/(net emitter)* compared with inside forest area (%) | 32.34 | (129.24) | 68.21 | 116.13 |

Source: Directorate General of Planning, Ministry of Forestry (2011), modified.

Table 12 shows that in 2009 there is a net emitter of 108.24 million tons of $CO_2e$. This indicates that outside the forest area there has occurred openings in the still existing vegeta-

tion cover (secondary forest 'mire forest', or shrubs), both for plantations, mining, or other land-based activities. When compared to a net sink in the area between the forest and outside forest areas, the net sink in forests is on the average 22% higher than outside the forest area. This proves that the function of forests to absorb carbon is higher than the non-forest.

# Bab 5 STRATEGIC ANALYSIS ON GREENHOUSE GAS EMISSION REDUCTION AND INCREASING FOREST CARBON STOCK IN SUSTAINABLE MANAGEMENT OF FOREST

Analysis tool used to assess the reduction in greenhouse gas emissions (GHG) emissions and increasing forest carbon stocks is to know the strengths, weaknesses, opportunities and threats that exist in the sustainable management of production forest. Then to conduct an analysis of the PELTS (Political, Economic, Legal, Technology, and Social) as a strategic environment that will affect the achievement of sustainable management of forest performance in reducing GHG emissions through prevention of emissions from deforestation and forest degradation, enhancing and maintaining carbon stocks through absorption and forest carbon sequestration through sustainable management of forest.

In analyzing the strengths, weaknesses, opportunities and threats of production forests to reduce GHG emissions, improve and maintain forest carbon stocks, six categories are differentiated in forest management directives on area allotment (Table 12). The directive is in accordance with that used by the Ministry of Forestry (Directorate General of Planning, 2011) in National Forestry Plan (RKTN).

Table 13. Directives for forest management through performance and acquisition of PHL certificate

| Directive on Forest Management | Category on Performance and Certificate | |
|---|---|---|
| Area for conservation | Good Performance (with PHL Certificate) | Poor Performance (without PHL certificate) |
| Area for protection of natural forest and peat lands | Good Performance (with PHL Certificate) | Poor Performance (without PHL certificate) |
| Area for forest and land rehabilitation | Good Performance (with PHL Certificate) | Poor Performance (without PHL certificate) |
| Area for large scale forest enterprise | Good Performance (with PHL Certificate) | Poor Performance – Neglected (without PHL certificate) |
| Area for small scale forest enterprise*) | Good Performance (with PHL/PHBML Certificate) | Poor Performance (without PHL or PHBML certificate) |
| Area for non-forestry **) | Good Performance (with PHL Certificate) | Poor Performance (without PHL Certificate) |

*) Certification for small-scale forest enterprise is not only for PHBM, but also for forest business which has an area of less than 7500 hectares.
**) Certification for non-forest area is adapted with its use

Problems that is faced as described in Chapter 3 provides guidance on how the strategy should be taken precisely in order to overcome the said problems. The following are some strategies to achieve GHG emission reduction, improvement and maintenance of carbon stocks in the PHL. This strategy is derived from the policies to be taken mainly by the government that has the leadership in solving those problems. The policy refers also to the Presidential Regulation No. 61 Year 2011 on REDD + Strategy and Action Plan (NAP) of GHG.

## 5.1. Strength, Weakness, Opportunity and Threats Analysis in Sustainable Production Forest Management

Based on the directives of the above area the analysis of the strengths, weaknesses, opportunities and threats on forest management is divided into 12 (twelve) categories (Table 12). Differences in the management of these areas are based primarily on differences in the basic principles of sustainable management. Management on areas for conservation, protection of natural forests and peat lands, as well as ecosystem restoration has the same basis, namely the protection of nature-based management and ecosystem conservation. Area management for forest and land rehabilitation has a base of both, depending on where the activity is carried out. Table 3 details the strengths, weaknesses, opportunities, and threats to formulate appropriate strategies for each of the directive guidance on the management for specific designation.

As for the management of forest areas for large and small scale enterprises is based on the utilization of forest products without leaving the social and environmental aspects. The difference lies in the extensive area of the managed forests and their management capabilities. Forest managed for large scale forest enterprise cover over 7,500 hectares managed with complex capacity, while the small scale forest enterprise cover an area of 7,500 hectares and lower, managed with simple capacity with modest amount of labor and very short organizational levels.

Non-forest area is within production forest (HPK) that can be converted and can be directed for other uses or returned to forest for the utilization of timber or non-timber according to the characteristics of the forest. The basis for area management is more focused on the protection of ecosystem rather than utilization of timber. Directive on this matter becomes very crucial because there could be a tug of war between the Government and Local Government due to self interest.

### 5.1.1. Area for Conservation, Natural Forest Protection and Peat Land

The most prominent force in the area for conservation management is the characteristic of the forests that should be preserved to protect biodiversity (flora and fauna) and its ecosystem. In addition, there are areas for the protection of natural forests and peat lands which controls the water system (hydro-orological), and at the same time also to protect the biodiversity (genetic resource), as well as the non-timber forest produce for the welfare of communities within and around forests.

With proper prevention of deforestation and forest degradation, both of these areas are extremely effective for carbon storage function. Activities in forest and land rehabilitation in both areas are important because these areas are able to absorb carbon. In order to avoid the region from deforestation and forest degradation, strategic steps to be carried are among others strict law enforcement, clarity of boundaries of the region, and reliable institutional managers.

Most prominent weakness is among others the limited human resources and budget to maintain and protect a wide area. Low appreciation of the managers of this area of

natural resources (flora and fauna) but has a high value. Equipment owned to work is still limited to enable to reach all areas of work which are generally inaccessible by road.

Opportunities include the reality of the importance of conservation or protection function so it is possible to get compensation in the form of payment for environmental services through a variety of patterns, both environmental services and incentive compensation upstream-downstream and loss of development opportunities, which may be more financially profitable.

The very real challenge is the pressure from various parties to the above two areas, which include expansion of the district / municipality, mining in the forest (illegal or official), encroachment by the people, infrastructure development (roads), and residential development.

### 5.1.2. Area for Land and Forest Rehabilitation

Rehabilitation of forest and land can occur in all area, except for non-forest areas (Table 12). Area for rehabilitation by the year 2030 is 11.55 million hectares scattered in areas for forest conservation (3.62 million hectares), protection forests (4.14 million ha), and production forest (2.23 million hectares in permanent production forest, and 1.78 million hectares in limited production forests).

Strength of the area for land and forest rehabilitation varies by location. On the conservation among others including the high stakeholder awareness of the dangers that will arise if the rehabilitation of degraded forests is not done. In addition, the multiple benefits that can serve as protection and utilization of forest (timber and non-timber) according to the allotment of area.

Weaknesses include limited budget to carry out the rehabilitation of forests and land in Indonesia. There is a reluctance of the holder of IUPHHK-HA for forest rehabilitation because of the absence of strict legal action if the manager does not perform its obligation to rehabilitate the working area. Incentive funding from a variety of climate change mitigation schemes that would be obtained is unclear if rehabilitation had been done.

Opportunities that can be captured from the forest and land rehabilitation measures, among others, there is still an open market of A / R CDM from several countries (Korea and Japan) to invest in the utilization of wood energy from environmentally friendly products (green product) instead of coal, as well as to support climate change mitigation. Although small, the chances of REDD + in this region is also still open for funding pattern of Liability Rule (LR).

The threat among others is the conflict of land use by communities, especially in and around the forest so that rehabilitation can not be done. Second generation technology to take advantage of a simple wood into energy (pellets) in lieu of coal has not been widespread in Indonesia. While the third generation technology of the use of wood as liquid timber energy is still unknown among the public and the business community.

### 5.1.3. Area for Large Scale Forest Enterprise

Forest business that has certificates has the strength and tendency to be able to manage forest in a sustainable manner compared to those that don't. Ability to prevent deforestation and forest degradation, carbon deposits and reserves, the ability to generate funding for innovative "green product" is much better than those who do not managed forest sustainably. Selective Cutting and Line Planting Scheme (TPTJ) or Indonesian Intensive Selective Cutting and Planting system (Intensive Silviculture-Silint) could result in increased productivity of trees compared to the species of trees growing in natural forest (1.5 times of the system TPTI). Good example is shown in the sustainable management of natural forests in the SBK (Box 5).

The most notable weakness is the inability to prevent deforestation and forest degradation. Forest entrepreneur who does not have a certificate or do not manage forest in a sustainable manner will experience the erosion of their assets resulting in lower revenue each year. In addition, there is a limited ability to finance SFM certification and experience shows that it is too expensive. Implementers of reduced impact logging (RIL) experienced limitation in facing both issues, but it is almost non-existent in small-scale entrepreneurs.

Both are offer almost the same opportunities, but large-scale forest entrepreneurs have less interest in entering the climate change mitigation schemes because its opportunity cost is relatively high. Bahruni (2011) examined the large entrepreneurs who manage their forests sustainably would be interested if the performance can be replaced with "replacement value" of carbon for a minimum of U.S. $ 42 per ton of carbon. Another opinion says that the replacement value may be lower with a minimum of U.S. $ 25 per ton of carbon. This value is very high compared to prices offered by buyers of carbon market that is only about less than U.S. $ 5 per ton of carbon.

Table 14. Strength, weakness, opportunity and threat of management of forests differentiated according to scale of forest management

| Scale of Forest Management | SWOT Analysis | |
|---|---|---|
| | **Good Performance (With SFM Certificate)** | **Poor Performance – Neglected (No SFM Certificate)** |
| **Area Management for Conservation, Protection of Natural Forests and Peat Land** | **Strength:**<br>• Recognized internationally as part of REDD+ which adopted conservation role;<br>• Existence is maintained in spite of Provincial RTRW Revision, prevents deforestation and forest degradation;<br>• High potential in carbon storage (protection & conservation function) and high value of peat land as "warehouse", and carbon uptake through forest rehabilitation action;<br>• Effective water management (hidro-orology) with vegetation cover above 80%, and producer of "*green products*";<br>• Posses data on remote sensing for forest inventory to support MRV in climate change mitigation;<br>• Able to combine application of forest development innovation integrated with climate change mitigation scheme and program of community empowerment. | **Strength:**<br>• Recognized internationally as part of REDD+ which adopted conservation role if manager is available and gradual improvement of performance;<br>• Existence is maintained in spite of Provincial RTRW Revision, prevents deforestation and forest degradation;<br>• Adequate high potential for carbon storage and carbon uptake through action of degraded forest rehabilitation;<br>• Amply effective water management (hidro-orology) with medium vegetation cover of between 60 – 80%, and producer of "*green products*";<br>• Posses data on remote sensing for forest inventory to support MRV in climate change mitigation;<br>• Ability of some innovation for integrated forest development with climate change mitigation scheme. |
| | **Weakness:**<br>• Managers do not understand climate change mitigation schemes, and very low participation;<br>• Low valuation on *HCVF* forest, low market value of carbon for this forest area;<br>• Limited fund, human resource, and tools to reach and control working area which is very extensive;<br>• Managers have difficulty in fulfilling complicated REDD+ schemes;<br>• Limited ability to withstand pressure on forest from various interest of land and forest resource use. | **Weakness:**<br>• Unable to prevent deforestation and forest degradation, especially from external factors;<br>• Managers has not understood climate change mitigation schemes, and low participation;<br>• Very hard to finance and acquire SFM certificate due to poor management;<br>• Absence or very little implementers of SFM in area of conservation and protection that apply *HCVF*;<br>• Businesses have difficulty in complying with requirement of REDD+ schemes which is complicated;<br>• Low awareness on forest fire. |

| | | |
|---|---|---|
| | **Opportunity:**<br>• Opportunity in open carbon market especially in REDD+, UDI, and DNS schemes, while limited for VCM and A/R CDM;<br>• Very high market on SFM-natural forest protection and peat land as carbon based forest management;<br>• SFM in Natural Forest and industrial forest plantation (HTI) on peat land has ample opportunity compared to mineral land;<br>• Receiving compensation in the form of funding incentive for conservation area (UDI) is higher than conservation function, natural forest protection and damaged peat land;<br>• Ample funding for effort in increasing harmonization with MDGs target. | **Opportunity:**<br>• Opportunity in open carbon market for all PI mitigation schemes (REDD+, UDI, DNS, A/R CDM, and VCM);<br>• Rehabilitation to enhance conservation function, natural forest protection and damaged peat lands, has opportunity to get incentive for funding (REDD+, A/R CDM, DNS, and VCM);<br>• Relatively lower market as carbon based forest management in SFM-forest conservation and protection compared to natural forest protection and peat lands;<br>• Funding incentive from REDD+ is available, while it is limited from VCM and A/R CDM;<br>• Ample funding for efforts in enhancing and harmonizing with MDGs target. |
| | **Threat:**<br>• Formation of commensurate and related national institution is ongoing so that local governance have not found stability;<br>• Mechanism on funding incentive and profit distribution is not clear yet, as well as procedure for permit in environmental services is complicated and long bureaucracy;<br>• Sensitive to leakages because of pressure from outside forestry sector, and fire danger;<br>• Very difficult to fulfill criteria of "*additionality*" at SFM of conservation function, and low participation;<br>• Ample strength in tag of war on interest of forest land use with other sector. | **Threat:**<br>• Formation of commensurate and related national institution is ongoing so that local governance have not found stability;<br>• Mechanism on funding incentive and profit distribution is unclear, as well as procedure for permit in environmental services is complicated and long bureaucracy;<br>• Sensitive to leakages because of pressure from outside forestry sector, and fire danger;<br>• Rather difficult to fulfill criteria of "*additionality*" at SFM, and low participation;<br>• Very strong tag of war on interest of forest land use with other sector. |

Table 14 ... (continue)

| Scale of Forest Management | SWOT Analysis | |
|---|---|---|
| | **Good Performance–Priority Watershed (DAS) (Critical)** | **Poor Performance– Utmost Priority (Very Critical)** |
| **Area Management for Forest and Land Rehabilitation** | **Strength:**<br>• Recognized internationally as part of A/R CDM (*Kyoto Protocol*) and REDD+ which adopted conservation role;<br>• Amply high potential in carbon uptake through forest and land rehabilitation that is critically degraded;<br>• Through very good land and forest rehabilitation and functioning as effective water management with vegetation cover reaching more than 80%;<br>• Availability of fund for rehabilitation as a program of GNRHL in Forestry National Strategy to improve conservation forest, protection and peat lands which are minimally degraded;<br>• Able to combine integrative innovation through forest and land rehabilitation with climate change mitigation scheme for community welfare. | **Strength:**<br>• Recognized internationally as part of A/R CDM (*Kyoto Protocol*) and REDD+ which adopted conservation role if there are managers and gradual performance improvement;<br>• High potential in carbon uptake through very critically degraded land and forest rehabilitation;<br>• With ample rehabilitation of land and forest, effective functioning of water (hidro-orology) management with medium vegetation cover of between 60 – 80%;<br>• Availability of fund to improve conservation forest, protection and peat land of Utmost Priority Watershed (DAS);<br>• Ability in a small innovation integrated with rehabilitation of critical land of utmost prioritized DAS with climate change mitigation scheme for the welfare of community. |
| | **Weakness:**<br>• Managers have not understood climate change mitigation schemes, and very low participation;<br>• Fund for maintenance of planting in rehabilitated land and forest is only limited at Priority DAS;<br>• Difficult to rehabilitate area of critical peat lands;<br>• Management find difficulty in fulfilling complicated schemes of REDD+ and A/R CDM, while UDI and DNS have not agreed;<br>• Limited ability to withstand the pressure on the forest from various interests for land use and utilization of forest resources; | **Weakness:**<br>• Unable to prevent deforestation and forest degradation, especially from external factors;<br>• Managers have not understood schemes of climate change mitigation, and low participation;<br>• Very burdensome to fund maintenance of plants resulting from forest and land which in a very extensive critical land (DAS with Utmost Priority);<br>• Managers have difficulty in fulfilling complicated schemes of REDD+ and A/R CDM, while UDI and DNS have not agreed;<br>• Difficult to rehabilitate forest area for very critical pet lands; |

| | | |
|---|---|---|
| | • Low awareness on land and forest fires. | • Low awareness on forest and land fires. |
| | **Opportunity:**<br>• Opportunity in the availability of an open carbon market especially in the REDD+, A/R CDM and DNS pattern, while it is limited for UDI and VCM;<br>• Very high market for rehabilitated area in SFM-natural forest protection and peat land;<br>• Receiving funding incentive for rehabilitation of critical land in production forest has ample opportunity if able to generate "*green products*";<br>• To get compensation in a form of a UDI funding incentive in areas for rehabilitation of protection forest and conservation higher than for production forest;<br>• Getting ample funding for effort in enhancing harmonization with MDGs target. | **Opportunity:**<br>• Have opportunity in open carbon market for all mitigation schemes of PI (REDD+, UDI, DNS, A/R CDM, and VCM);<br>• Rehabilitation to enhance conservation functions, protect-ion of damaged natural forest and peat land provide opportunity of getting incentive for funding (REDD+, A/R CDM, DNS, and VCM);<br>• Getting funding incentive for rehabilitation of utmost critical land in production forest provide great opportunity if it resulted in generating "*green products*";<br>• Receiving compensation in the form of UDI funding in areas for rehabilitation of protection forest and conservation incentive is higher compared to production forest;<br>• Getting adequate funding for effort in the enhancement of harmonization with MDGs targets. |
| | **Threat:**<br>• Formation of commensurate and related national institution is ongoing so that local governance have not found stability;<br>• Mechanism for funding incentive and profit distribution is unclear, procedure for environmental services permit is complicated and long bureaucracy;<br>• Adequately sensitive for leakages because of outside forestry sector, and fire danger;<br>• Technology resulting in "*green products*" have not been widely mastered for new and renewable energy, for second generation (pellets) and third generation (liquid wood or methanol);<br>• Strong tug of war on interest of forest land use by other sectors in open and critical area. | **Threat:**<br>• Formation of commensurate and related national institution is ongoing so that local governance have not found stability;<br>• Mechanism for funding incentive and profit distribution is unclear, procedure for environmental services permit is complicated and long bureaucracy;<br>• Very sensitive for leakages because of outside forestry sector, and fire danger;<br>• Technology resulting in "*green products*" have not been widely mastered for new and renewable energy, for second generation (pellets) and third generation (liquid wood or methanol);<br>• Very strong tug of war on interest of forest land use by other sectors especially in open and very critical area. |

Table 14 ... (continue)

| Scale of Forest Management | SWOT Analysis | |
|---|---|---|
| | **Medium – Good Performance (With PHPL Certificate)** | **Poor Performance – Neglected (No PHPL Certificate)** |
| **Big Scale Forest Enterprise** | **Strength:**<br>• Internationally acknowledged as practicing sustainable forest management;<br>• Able to prevent deforestation and forest degradation and other social pressures;<br>• Possess the potential of high carbon uptake and carbon reserve (production forest as a "warehouse") through actions of planting and enrichment planting;<br>• Concession holder possess working permit with sustainable production forest business (PHPL) certificate;<br>• Availability of fund to rehabilitate forest with slight degradation.<br>• Able to adapt innovative forest development integrated with climate change mitigation schemes. | **Strength:**<br>• Internationally acknowledged as practicing SFM if manager is available and gradually improve performance;<br>• Availability of forest safeguarding to prevent outside pressures;<br>• Possess potential in high carbon uptake through actions of planting /enrichment planting;<br>• Concession holder still owns business permit and make serious effort to improve forest through SPFM (PHPL);<br>• Still retain reserve fund, even though in small amount to extend business permit.<br>• Ability of some innovation in developing integrated forest development with climate change mitigation schemes. |
| | **Weakness:**<br>• Managers are still unfamiliar with climate change mitigation schemes and very low participation;<br>• Felt that cost of attaining SFM certificate is relatively expensive;<br>• Limited number of SFM managers adopt the reduced impact logging (RIL);<br>• Businesses difficult to accept requirement of A/R CDM and the complicated REDD+ scheme;<br>• Limited ability to withstand pressures of various interests for land use and utilization of forest resources. | **Weakness:**<br>• Unable to prevent deforestation and forest degradation, especially from outside factors;<br>• Management has not understood schemes of climate change mitigation, and low participation;<br>• Very burdensome to finance and attain SPFM certificate due to poor management,<br>• Absence or very little SPFM managers applied reduced impact logging (RIL),<br>• Business have difficulties to fulfill requirement of A/R CDM, and complicated REDD+ scheme;<br>• Low awareness on forest fire. |

| | | |
|---|---|---|
| | **Opportunity:**<br>• Availability of carbon market opportunity which is open especially REDD+, while VCM dan A/R CDM are limited;<br>• Availability of extensive area of forest: PHPL-HA has opportunity to get funding incentive compared to HTI;<br>• PHPL-HA and HTI in peat land has ample opportunity compared to mineral land;<br>• To receive funding incentive (bonus) for REDD+, while for A/R CDM and VCM limited availability;<br>• Applied innovative forest development integrated with climate change mitigation scheme. | **Opportunity:**<br>• Availability of opportunity in open carbon market for all schemes of PI mitigation (REDD+, A/R CDM, and VCM);<br>• Extensive area of forest: PHPL-HA has opportunity to get funding incentive compared to HTI;<br>• PHPL-HA and HTI in peat land has more opportunity compared to mineral land;<br>• Available funding incentive from REDD+, while it is limited for VCM and A/R CDM;<br>• Little ability to apply innovative forest development integrated with climate change mitigation scheme. |
| | **Threat:**<br>• Formation of commensurate and related national institution is ongoing so that local governance have not found stability;<br>• Mechanism on funding incentive and profit distribution is unclear, complicated procedure on environmental services permit and long bureaucracy;<br>• Sensitive for leakages because of pressure from outside of forestry sector and the dangers of forest fire;<br>• Very difficult to conform with criteria of "*additionality*" in PHPL, as well as low participation;<br>• Strong tug of war of various interest in forest land use for other sectors. | **Threat:**<br>• Formation of commensurate and related national institution is ongoing so that local governance have not found stability;<br>• Mechanism on funding incentive and profit distribution is unclear, complicated procedure on environmental services permit and long bureaucracy<br>• Very sensitive for leakages because of pressure from outside of forestry sector and the dangers of forest fire;<br>• Rather difficult to conform with criteria of "*additionality*" in PHPL, as well as low participation;<br>• Very strong tug of war of various interest in forest land use for other sectors. |

Table 14 ... (continue)

| Scale of Forest Management | SWOT Analysis | |
|---|---|---|
| | **Medium – Good Performance (With PHPL Certificate)** | **Poor Performance – Neglected (No PHPL Cerificate)** |
| **Small Scale Forest Enterprise** | **Strength:**<br>• Acknowledged and received major attention internationally on its aim to alleviate poverty and receive support from indigenous community and regional participation;<br>• Able to prevent deforestation and forest degradation, as well as other social pressures (respect tenure rights);<br>• Have low potential of carbon uptake but has a high carbon storage (production forest as carbon "warehouse") through planting of slightly degraded area;<br>• Concession holder has business permit and PHPL certificate, efficient and effective management;<br>• Availability of fund to improve slightly degraded forest. | **Strength:**<br>• Acknowledged and received major attention internationally on its aim to alleviate poverty and receive support from indigenous community and regional participation;<br>• Quite able to prevent deforestation and forest degradation, as well as other social pressures, forest safeguarding to prevent outside pressure;<br>• High potential of carbon uptake through activities of planting in highly degraded area;<br>• Concession holder is still retaining business permit and put effort in improving and increasing carbon reserve through PHPL;<br>• Has funding reserve even though only a little for extending business permit. |
| | **Weakness:**<br>• Managers have not understood climate change mitigation schemes, and awareness to participate;<br>• It is felt that cost of getting PHPL certificate is relatively expensive;<br>• Managers of HKm, HD, and HTR have difficulties in fulfilling requirements of A/R CDM and REDD+ scheme is complicated;<br>• Limited ability in resist pressure on land from various interest of land use and utilization of forest resource;<br>• Community based forestry (HKm, HD, and HTR) have low forest management ability;<br>• Low awareness about forest fire. | **Weakness:**<br>• Unable to desist deforestation and forest degradation, especially from external factors;<br>• Managers have not yet understood climate change mitigation schemes, and awareness to participate;<br>• Very burdensome to finance acquisition of PHPL certificate due to poor management,<br>• Managers of HKm, HD, and HTR have difficulties in fulfilling requirement of A/R CDM, and REDD+ scheme is intricate;<br>• Community based forestry (HKm, HD, and HTR) have low ability to manage forest;<br>• Low awareness on forest fire; |

| | | |
|---|---|---|
| | **Opportunity:**<br>• Open carbon market especially REDD+, while VCM and A/R CDM are limited;<br>• PHPL-HTR, HKm, and HD have high opportunity for getting funding incentive compared to large scale HA and HTI that failed to be managed by PHPL;<br>• PHPL- HTR, HKm, and HD in peat land has more opportunity compared to mineral land;<br>• Receive funding incentive (bonus) for REDD+, while A/R CDM and VCM is limited;<br>• Applied *Millenium Development Goals* (MDGs) related to PI mitigation. | **Opportunity:**<br>• Open carbon market for REDD+, A/R CDM, and VCM schemes;<br>• PHPL-HTR, HKm, and HD have good opportunity for funding incentive compared to large scale HA and HTI which experience failure through PHPL management;<br>• PHPL- HTR, HKm, and HD in peat land has good opportunity compared to mineral land;<br>• Funding incentive from REDD+ is available, while it is limited for VCM and A/R CDM;<br>• Application of *Millenium Development Goals* (MDGs) related to PI mitigation. |
| | **Threat:**<br>• Formation of commensurate and related national institution is ongoing so that local governance have not found stability;<br>• Can lead to degradation and the "tragedy of common ownership" in HTR, and HKm;<br>• Mechanism of funding incentive and profit distribution is unclear, the procedure is simple but long bureaucracy;<br>• Very sensitive to leakages because of pressures from outside the forestry sector;<br>• Prone to corruption, mismanagement, and political enforcement, and low participation;<br>• Tug of war of various interests in forest land use for other sectors. | **Threat:**<br>• Formation of commensurate and related national institution is ongoing so that local governance have not found stability;<br>• Can lead to degradation and the "tragedy of common ownership" in HTR, and HKm;<br>• Mechanism of funding incentive and profit distribution is unclear, the procedure is simple but long bureaucracy;<br>• Very sensitive to leakages because of pressures from outside the forestry sector;<br>• Prone to corruption, mismanagement, and political enforcement, and low participation;<br>• Tug of war of various interests in forest land use for other sectors. |

Table 14 ... (continue)

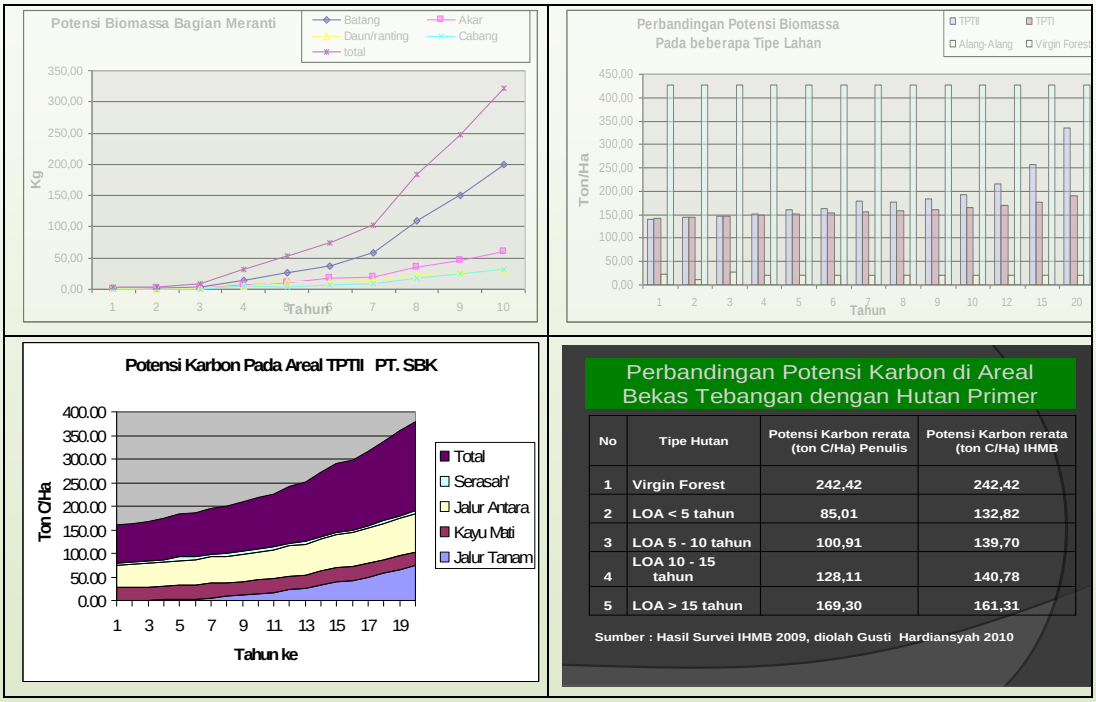
| Scale of Forest Management | SWOT Analysis | |
|---|---|---|
| | **Good Performance (With PHL Certificate)** | **Poor Performance – Neglected (No PHL Certificate)** |
| **Area management for Non-Forestry** | **Strength:**<br>• Internationally recognized as part of the REDD + and A / R CDM for non-forest areas that remain to function as forest;<br>• High potential in carbon storage (forest functions as a "warehouse" of carbon, and carbon uptake if together with planting of trees and / or tree crops;<br>• Regulator of water (hydro-orology) which is effective with the vegetation cover of over 80%, and producer of "green products" as well as new and renewable energy;<br>• Have data on remote sensing for forest inventory to support MRV in climate change mitigation;<br>• Able to combine application of innovative development of forest integrated with climate change mitigation schemes and community empowerment program in non forestry sector. | **Strength:**<br>• Internationally recognized as part of the REDD + and A / R CDM for non-forest areas that remain to function as forest;<br>• High potential in carbon storage (forest functions as “warehouse” of carbon karbon, and carbon uptake if together with planting of trees and/or tree crop;<br>• Regulator of water (hydro-orology) which is effective with the vegetation cover of over 80%, and producer of "green products";<br>• Have data on remote sensing for forest inventory to support MRV in climate change mitigation;<br>• Ability in some innovation for forest development integrated with climate change mitigation and empowering non-forestry community sector. |
| | **Weakness:**<br>• Managers has not yet understood climate change mitigation schemes, and very low participation;<br>• Low economic value carbon trade if kept as forest compared to other sectors;<br>• Not a priority for forest development for region and very sensitive to changes for forestry business;<br>• Business have difficulty in complying to requirements of complicated REDD+ and A/R CDM schemes;<br>• Low awareness on forest fire. | **Threat:**<br>• Unable to prevent deforestation and forest degradation especially from outside factor;<br>• Managers have not understood climate change mitigation scheme and low participation;<br>• Not a priority of forest development for the region and very sensitive to changes for forestry business;<br>• Business have difficulty in complying with requirements of complicated REDD+ and A/R CDM schemes;<br>• Low awareness about forest fire. |

| | | |
|---|---|---|
| | **Opportunity:**<br>• Available carbon open market especially for REDD+ and DNS schemes, while it is limited for VCM and A/R CDM;<br>• High market on area for non-forestry for community based forestry, specifically HR for carbon trade;<br>• Funding incentive available for critical land rehabilitation in convertible production forest if it can produce "*green products*" and new and renewable energy;<br>• Very high compensation in the form of funding of PDR pattern compared to other patterns (PES dan LR);<br>• Adequate funding for effort in enhancing harmonization with aims of MDGs. | **Opportunity:**<br>• Available open carbon market for all PI mitigation scheme (REDD+, DNS, A/R CDM, and VCM);<br>• Very high market for non-forestry area as community based forestry, especially HR for carbon trade;<br>• Funding incentive available for critical land rehabilitation in convertible production forest if it can produce "*green products*" and new and renewable energy;<br>• Very high compensation in the form of funding of PDR pattern compared to other patterns (PES dan LR);<br>• Adequate funding for effort in enhancing harmonization with aims of MDGs |
| | **Threat:**<br>• Formation of commensurate and related national institution is ongoing;<br>• Mechanism of funding incentive and profit distribution is unclear, procedure for environmental service permit is complicated and long bureaucracy;<br>• Adequately sensitive for leakages because of outside forestry sector pressure, and fire danger;<br>• Technology resulting in "*green products*" has not been widely mastered for new and renewable energy, either for second generation (*pellets*) or the third (liquid wood or methanol);<br>• Strong tug of war for land use interest (stronger for non-forestry rather than kept to function as forest). | **Threat:**<br>• Formation of commensurate and related national institution is ongoing;<br>• Mechanism of funding incentive and profit distribution is unclear, procedure for environmental service permit is complicated and long bureaucracy;<br>• Very sensitive for leakages because of pressures from outside forestry sector, and forest fire;<br>• Technology resulting in "*green products*" has not been widely mastered for new and renewable energy, either for second generation (*pellets*) or the third (liquid wood or methanol);<br>• Strong tug of war for land use interest (stronger for non-forestry rather than kept to function as forest). |

## BOX 5

## Intensive Silviculture (Silint) in Sustainable Natural Forest Management Supporting Climate Change Mitigation in Indonesia

**Intensive Silviculture (Silint) in Sustainable Natural Forest Management (PHAPL)** has been practiced by P.T. Sari Bumi Kusuma (SBK) in West Kalimantan. The area of Forest Product Utilization License (IUPHHK)-Natural Forests is 147,600 hectares, comprising of 13,210 ha of unproductive areas, 9,407 ha of protected areas, effective area for the production of 124,983 ha, harvest area 4,999 ha per year (with average production in the last 10 years of 234,533 $m^3$ (Ø 40 cm) or 46 $m^3$/ha. Productivity of SBK is 234,533 $m^3$ per year or 1.87 $m^3$/ha/th, while national productivity is 0.5 $m^3$/ha/th.




| No | Tipe Hutan | Potensi Karbon rerata (ton C/Ha) Penulis | Potensi Karbon rerata (ton C/Ha) IHMB |
|---|---|---|---|
| 1 | Virgin Forest | 242,42 | 242,42 |
| 2 | LOA < 5 tahun | 85,01 | 132,82 |
| 3 | LOA 5 - 10 tahun | 100,91 | 139,70 |
| 4 | LOA 10 - 15 tahun | 128,11 | 140,78 |
| 5 | LOA > 15 tahun | 169,30 | 161,31 |

Sumber : Hasil Survei IHMB 2009, diolah Gusti Hardiansyah 2010

Potential total biomass (trunks, branches, twigs, leaves, and roots) on meranti species (Shorea leprosula) is 350 kg (0.35 tons). Potential is higher than Indonesian Selective Cutting and Planting system (TPTI) without Silint. TPTI system and TPTI (Intensive) showed that the growth of trees up to 4 years is still the same, but after 20 years of almost 2-fold for TPTI (Intensive). Carbon potential for primary natural forests (virgin forest) is 242.42 ton C / ha), while in the Logged over Area (LoA) > 15 year it is 169.30 tons C / ha (Hardiansyah, 2010). Furthermore, it is stated that the ratio between carbon potential and TPTI and TPTII is approximately 4.27 million tons of C ≈ 15.65 million tonnes of $CO_2e$.

Another benefit of the system TPTJ or Silint compared to TPTI is among others (1) absorb and store carbon much higher than TPTI, (2) recognized by society because it is cultivated by the company, (3) increase income of communities near forest almost 2-fold from Rp351,715/month to become Rp 614,020/month, and (4) absorb manpower four times as much.

Challenges to be faced include the ongoing establishment of related appropriate national institutions, funding and incentive mechanisms and the distribution of profits is unclear. In addition, complicated licensing procedure for environmental services and the long bureaucracy. Also, quite susceptible to leakages due to pressure from outside the forestry sector, and the danger of fire, and very difficult to meet the criteria of "additionality" in the SFM, and the low participation. Another things, is the strong tug of war by various interests for forest land use from other sectors.

### 5.1.4. Area for Small Scale Forest Enterprise

Strength of small-scale forestry enterprises with certificate is receiving attention internationally because of issues of poverty reduction appropriate with millennium development goals (MDGs). Appreciation / respect for the rights of tenure get more clarity than for non-certified entities. Ability to prevent deforestation and forest degradation, carbon storage and reserve is better than enterprises that are not managed sustainably.

The most notable weakness is the inability to prevent deforestation and forest degradation. Small-scale forest enterprises which do not have a certificate or do not practice sustainable management will be increasingly neglected and has the potential to erode their assets causing lost opportunity to have benefit at the end of the planting cycle. Both felt that SFM certification is too expensive to finance. There is no implementation of reduced impact logging (RIL) in both causing difficulties to get climate change mitigation funding incentive from the various schemes offered by both mandatory and voluntary schemes.

Both have almost the same opportunities, but for small-scale entrepreneurs who has certificates have a much better chance of entering the climate change mitigation schemes because it has fulfilled the preservation requirements. Incentive funding will be obtained by small-scale forestry entrepreneurs are earning during the waiting period before wood or other produce are obtained during the crop cycle. These opportunities will be greater if large scale entrepreneur fail to make SFM and is unable to share equitably the benefits of forest products (Angelsen, 2011).

Both have relatively the same challenges that revolve around weak management and vulnerable to corruption, mismanagement, and political enforcement. In addition, community forestry can lead to degradation and the "tragedy of the commons" because dispute amongst land owner because of unclear land area boundaries. Next is associated with a high opportunity cost when faced with a choice of products, such as the public would prefer plantation or mining on their land compared to managing forests that will yield less.

### 5.1.5. Area for Non-Forestry

The most prominent strength in the management area for non-forestry is the presence of vegetation cover that can still be maintained as forest. In addition, it also has the strength aspect if there are areas for protection of natural forests and peat lands which controls the water system (hydro-orology), as well as to protect biodiversity (gene-plasm), and availability of non-timber produce for the welfare of communities in and around forest.

With proper precaution of preventing deforestation and forest degradation, the area is quite effective for carbon storage function. Carbon sequestration and storage functions also apply to forest ecosystem restoration actions that will be allocated to this area. Natural succession in this area will also improve the functioning of forest structure that can absorb and store carbon in trees and vegetation below. Carbon sequestration function is still maintained in this area when it was replaced by plantations or other agricultural crops.

Pronounced weakness is the limited human resource and budget to maintain and protect the areas that have been allocated for other uses. Location maps used often do not correspond to field reality. Government policy to allocate the area is sometimes not stable in this area because of specific interests as a result of pressure from various parties.

Opportunities include the reality of the importance of forest functions for non-forest areas so it is possible to get compensation in the form of payment for environmental services through a variety of patterns, both environmental services and other incentives. This is done to compensate for loss of development opportunities, which may be more financially profitable. The affected community should get the distribution of benefits from such compensation due to loss of livelihood and alternatives to earn extra income.

The threat that is very strong and real is the pressure from various parties to the region because it has been allocated for other uses. Other pressures, as well as the uncontrolled encroachment by the people since they know that the forest will be converted to non-forestry uses. The hardest to overcome this threat is when the land occupation has occurred, for example, land has been used for other uses, either by private or public.

## 5.2. Position and Strategy Alternatives

In determining the position of the quadrant, weighting and rating is done as specified in the method of assessment (Chapter 1). The position may be similar, but different coordinates will determine different strategies, the focus may be on the carbon market segmentation or different forms of compensation received for each of the selected scheme. Table 13 states throughout the strategies needed for each of the different categories of forest management according to its function.

General policy for the entire directive category in area management for a specific purpose as stated in Table 13 is pushed to obtain certification, both ecosystem-based certification (PHL) on the conservation and protected function-based areas (PHPL) and in area for large and small forest enterprises. The certification process for area for forest and land rehabilitation, depend on the location of certification process where the area will be rehabilitated. Whereas for non-forest areas are not in a certified category because it is outside forestry.

Performance assessment standards should be adjusted to international standards, especially for international funding. Adjustment to international standards is important because the incentives from the international funding that sets its own criteria and indicators, which are sometimes different from the standard applicable at the national level. However, the standard to be used for assessing the performance of SFM using source of domestic funds is

not a measure of all the individuals or companies with CSR funds or other public funds can be channeled for the purpose of mitigation of climate change unilaterally.

### 5.2.1. Position of Area Management According to Purpose Category

Based on the scoring done, the position for conservation area management with good performance is located in **Quadrant-1** which is strong in the legality and the ability to reduce emissions and increase carbon stocks, but enough to have the opportunity to enter a large potential market. While the position of conservation area management with poor performance is in **Quadrant-2** which is weak, but still have the opportunity to enter the carbon market.

In the meantime, position of area management for natural forest protection and peat lands which has good performance is located in **Quadrant-1** which is strong and has good opportunity to enter forest carbon market. While area for natural forest protection and peat lands with poor performance is located at **Quadrant-3** which is weak and threatened but still have market opportunity by taking advantage of bilateral as well as multilateral grants to improve its performance.

Position of area management for land and forest rehabilitation with good management performance is located at **Quadrant-1** which is strong because it is able to increase carbon sequestration by means of planting/enrichment planting activities in degraded area and have a high market opportunity as SFM. While area for forest rehabilitation with poor performance is located in **Quadrant-3** which is weak and threatened by pressures of other sectors and/or local communities or migrants. Below depicts the strategies from each of the said categories.

Position for area management of large scale enterprise is located in **Quadrant-1** which is strong in legality and its ability to decrease emission and increase carbon reserve, however has little opportunity to enter a high market potential. While the position of large scale enterprise that is not managed in a sustainable manner has a position in **Quadrant-2** which is weak in preventing forest degradation that increases GHG emission and less able to increase carbon sequestration through activities of planting/enrichment planting, but has a high market opportunity.

Position of small scale forest enterprise managed in a sustainable way to lower GHG emission and increase carbon stock is located at **Quadrant-2**, which is rather weak and has greater opportunity compared to small scale forest enterprise that is not managed in a sustainable way. Being said as rather weak because manager has limited ability to take silviculture actions toward business perpetuity. They can alter land function with ease, changing the function of land to other business outside forestry such as agriculture, estate crop plantation, mining, and livestock farming (Sunderlin dan Atmaja, 2011).

Furthermore, the position of small scale forest enterprise which is not managed sustainably is within **Quadrant 3**, which is weak and threatened. The condition is very real observed in the field where land that is utilized to generate income has very low productivity, and can be easily left behind by owner or changed its purpose into non-forestry business.

Position of area management for non-forestry which is managed sustainably is located at **Quadrant-1**, which is strong and has greater opportunity compared to land that is not

managed in a sustainable manner. Said to be strong because manager is very aware of his ability to implement forest tree plantation, agriculture, and estate crop plantation toward perpetuity of business. They can make proper alterations in land productivity without changing the function of land into other uses. On the other hand, if they do business in the field of forestry, for example People Forest (Hutan Rakyat or HR) the position is still strong if they have very good relationship with the market.

On the other hand, position of area management for non-forestry which is not managed sustainably is at **Quadrant 3**, which is weak and threatened. Such condition could be observed very clearly in the field where land to be used for livelihood has very low productivity, and could be easily abandoned by its owner or its purpose of use is altered into other more profitable venture.

### 5.2.2. Strategy of Area Management According to Category of its Allocation

Below is shown each strategy according to categories of management performance in accordance with its position. Each position of area management according to its category is mentioned in Session 5.2.1. Following strategies are efforts which should be done to overcome threats and weakness each by means of utilizing existing strength and opportunity. Box 6 and Box 7 give illustration on the importance of natural forest protection area and conservation area in National Park entering climate change mitigation scheme through rehabilitation of degraded zones.

#### 5.2.2.1. Strategy of Area Management for Conservation, Natural Forest Protection and Peat Land

First, strategy for area management for conservation with good performance are (1) prefer to chose mandatory carbon market with *cap-and-trade* system within schemes of REDD+ and UDI which have compensation value or payments against performance that is higher compared to voluntary market (PES pattern). Then, it also will (2) direct aim for eco-tourism targets, research location, biotic biodiversity bank with HCVF as priority, and utilization of non wood forest produce, (3) protect and maintain carbon reserve in the area with funds from national and regional government budget (APBN/APBD), and by means of determining this area as a conservation area to get compensation from UDI scheme, (4) safeguard this area from deforestation and forest degradation by means of defending the area from revision of Provincial RTRW to receive compensation (PDR pattern). Furthermore, (5) create innovations which integrate development programs that enhances community livelihood from this region by means of cross sector partnership.

Second, strategy of area management for conservation with poor performance are among others (1) prefer closed carbon market sourced from CSR funds, national as well as international, or other public funding according to REDD+ scheme and UDI (PES pattern), (2) rehabilitate forest and Utmost Priority and Priority DAS lands to take advantage of funding incentive from A/R CDM. Then, (3) protect and maintain carbon reserve in this region (funds from APBN/APBD), and by determining part of this area as conservation area to get compensation from UDI scheme. Furthermore, (4) prevent part of this area from deforestation and forest degradation by means of defending the area from the revision of provincial RTRW to

get compensation (PDR pattern), and (5) create innovation which integrate development programs which enhances community livelihood through cross sector partnership.

Third, almost similar with the above which is area management for protection of natural forest and peat land with good performance, directed through strategies (1) chose mandatory and voluntary carbon market with *baseline-and-trade* system in schemes of REDD+, VCM, A/R CDM, UDI, and DNS which has compensation value for payment for higher performance (PES pattern). Then, also will (2) direct this area especially that part which has not been managed by FMU for natural forest and forest plantation and at the same time to allocate it as producer of "*green products*", (3) maintain carbon reserve by making this area to have protection function or protection forest, biodiversity bank with HCVF priority, and utilization of non-wood forest produce, (3) protect and maintain carbon reserve in this area (fund from grant of bilateral agreement for REDD+ implementation) as an implementation of *forest-based carbon* and *carbon stock*, (4) prevent this area from deforestation and forest degradation by means of defending this area from Provincial RTRW revision to receive compensation (PDR pattern), and determine this area as having a protection function and/or protection forest to get compensation from UDI scheme. Furthermore, (5) create innovation which integrate development programs which enhances community livelihood from this area through cross sector partnership programs, including "*green products*".

Fourth, area management for natural forest protection and peat lands with poor performance is directed at strategy (1) selecting mandatory and voluntary carbon market with *baseline-and-trade* and/or *cap-and-trade* system in REDD+, VCM, A/R CDM, UDI and DNS schemes which have compensation value or payment for higher performance (PES and LR pattern). The said LR pattern is directed for carbon *off-setting* on the magnitude of emission in their country or company.

Then, it will also (2) directs this region, especially those that has not been managed by the management unit for the cultivation of natural forest or forest plantation (3) maintain carbon stocks by making this area to become protected areas or protected areas, biodiversity bank with HCVF priorities, and utilization of non-timber forest produce, (4) to protect and maintain carbon stocks in this area (funds from the grant of bilateral agreements for the implementation of REDD +) as the implementation of forest-based carbon, (5) prevent the region from deforestation and forest degradation by maintaining this area from revisions of the Provincial RTRW to get compensation (PDR pattern), and set some of the region as a function of protected areas and / or protected forest for compensation from UDI schemes. Then, (6) create innovations that integrate development programs which increase the livelihood of communities through cross sector partnership program.

**BOX 6**

**Potential of National Park in Conservation Forest as Absorber, Sequestration, and Maintenance of Forest Carbon**

Conservation forest in the Meru Betiri National Park (TNMB) East Java own its own uniqueness. TNMB consists of various vegetation type starting from mountain vegetation until the shoreline and is rich in species biodiversity, with presence of communities within and around TNMB that give positive and negative influence on its existence. TNMB is compatible for REDD project because this area has undergone unplanned deforestation and degradation of conservation forest. The enactment of TNMB based on Minister of Forestry Decree No. 227/Kpts-VI/1997, with an area of 58.000 hectare, consists of 37.586 hectare in Jember District , and 20.416 hectare in Banyuwangi District.


Target that will be reached is to increase the livelihood of local communities living inside and around the area of Meru Betiri National Park (TNMB) through participation to evade deforestation and degradation of the area, and the disappearance of bio-diversity.

Besides, it is to develop the *MRV* system in the framework of monitoring emission reduction from deforestation and forest degradation and increase of carbon stock at TNMB.

Activities that has been done is to get an output of community participation in enhancing management of forest conservation through (1) evaluation of existing schemes and lessons learned from surrounding and other areas, (2) consultation and cooperation of stakeholders in conservation, (3) building partnership for TNMB conservation, (4) conduct *awareness raising* program and institutional development for REDD and REDD+, (5) doing training in community participation *MRV* carbon stock, (6) to do methodology on carbon calculation based on *IPCC Guideline*, *VCS*, and others, (7) to do training on forest protection for communities, (8) to build SOP for calculation and control, (9) remote sensing analysis, (10) fixing definition of activities and making of PSP, and (11) fixing *baseline*.

### 5.2.2.2. Area Management Strategy for Land and Forest Rehabilitation

Strategy in area management for forest and land rehabilitation in sustainably managed forest and with good performance are (1) prefer mandatory carbon market that has compensation value or payment for higher performance compared with voluntary market. Climate change mitigation scheme that can be used are REDD+, VCM, A/R CDM, UDI, and DNS in accord with category of forest area which is rehabilitated. Then, it will also (2) conduct detailed inventory through remote sensing for its MRV, (3) accelerate rehabilitation border

delineation to make firmer forest carbon rights for managers and/or concession holder, (4) forest repair and improvement is directed to the degraded area. Other strategy that is still needed related to A/R CDM in conservation and protection area are (5) to plant tree species producing non-wood, including bio-energi such as resin, nyamplung oil, damar, bintaro, tengkawang, and others.

In the meantime, strategy in forest area management for forest and land rehabilitation with poor performance are (1) to select mandatory and voluntary carbon market with *baseline-and-trade* and/or *cap-and-trade* system in REDD+, VCM, A/R CDM, UDI and DNS (PES and LR compensation pattern) schemes in the framework of *carbon sequestration*. The said LR pattern can be directed for carbon *off-setting* on the magnitude of emission in the country or company commensurate with forest area category which is rehabilitated according to the priority of its DAS. Then, (2) to do meticulous inventory through remote sensing for its MRV, (3) accelerate border delineation for rehabilitated area to make firm the forest carbon right for managers and/or concession holder, (4) forest restoration and repair directed at degraded area. Other strategy needed related to A/R CDM in forest conservation and protection area, as well as in production forest is (5) to plant tree species producing non-wood produce. While in area for forest rehabilitation in production forest can be directed to produce "*green products*".

#### 5.2.2.3. Strategy for Area Management for Large Scale Forest Enterprise

The strategy chosen for the two differ. Strategy for large-scale forest enterprises that is sustainably managed is (1) prefer a mandatory carbon market that has a value of compensation or payment for the performance that is much higher than the voluntary market. Then, it will also (2) prioritize the mandatory markets that provide compensation or to pay the much higher performance, (3) accelerate the enactment of production forests to reinforce the rights of forest carbon for concession holders, (4) restoration and improvement of forest area are directed at degraded HP, (5) implement the innovation with intensive silviculture techniques (Silint) to increase the productivity of carbon sequestration. Another strategy is still needed regarding the use of energy, namely (6) large-scale forest enterprises can participate in building new and renewable energy. Lodging in remote location in the forest, the issue of energy, (fuel oil), is often an obstacle in the operation. In addition, it also needed a strategy to (7) modify evaluation standard of SFM performance related to the climate change mitigation scheme, and adapted to international standards. Adjustment to international standards is important because the incentives from the international funding that sets its own criteria and indicators, which are sometimes different from the standard applicable at the national level.

While large-scale forest enterprises that are not managed sustainably, the strategy is to (1) choose the REDD + or other schemes that can help improve the company's financial liquidity. Many applicants for forest areas in Indonesia leads to carbon-based management performed through the licensing process forest ecosystems restoration (RE). They aim at peat land location because the largest portion of carbon reserves is in this region. The next necessary strategy, among others, (2) enter the voluntary market, although the compensation or paying performance with a lower value, (3) gradual certification for large-scale forest enterprises to enter the forest carbon market, (4) implement an environmentally friendly logging techniques with reduced impact logging (RIL) and increase the capacity of executor, (5) direct the REDD scheme for large-scale forest enterprises with poor performance or in the process of improvement to obtain a certificate, (6) clarify the borderline of work area for large-scale forest enterprises to ensure business certainty. Very important matters to be done in order to succeed in this achievement are (7) consistent law enforcement against wood

traffickers and illegal logging, including mining in forest areas, as well as encroachment and forest fires. In addition a strategy is required for (8) clear spatial arrangement of the forest with definite legal power to clarify the rights of forest and carbon through the establishment of work area, and (9) diversify the forestry business that does not conflict with climate change mitigation scheme.

**BOX 7**

## Mamuju (West Sulawesi) Natural Forest as Absorber, Sequestration, and Maintenance of Forest Carbon Stock through REDD+ Scheme

Mamuju Habitat is a joint development project between Keep the Habitat REDD (Australia) and the Government of West Sulawesi province, Mamuju District, PT Inhutani I Mamuju, PT Sulwood, Green World and PT Zedsko Permai. Mamuju planned to invest in tree planting to protect the remaining natural forests that are still good and to develop wood processing industry in West Sulawesi, as well as job creation, business development, infrastructure development and community development. Area based on SK HPH No.350/Kpts-II/1996 is 48,640 hectare (confirmed in 2004 to become 29,937 hectares). Land cover conditions: 16,318 hectares of virgin forest, 11,761 hectares of Logged over Area (LoA), and 1,858 hectares are non-forested aea. Dominant topography is steep to very steep. The results of the 2007 PHAPL assessment with predicate: Moderate.

Potential for REDD activities include (1) reforestation or rehabilitation, enrichment planting, etc., (2) afforestation through community forest and land and forest rehabilitation movements, (3) sustainable management of forests and Reduced Impact Logging (RIL), (4) prevention of deforestation, and (5) increase the utilization of wood waste from industrial activities and harvesting of timber. In general, deforestation in the province of West Sulawesi is ongoing, both in the forest areas managed as IUPHHK-HA as well as in protection forest or forest conservation.

In 2008, area of IUPHHK-HA PT Inhutani I Mamuju is 30,000 ha of sustainably managed virgin forest protection and planting in logged over area (LoA). Sources of funding are from CSR of Australian and Indonesian corporations. In 2009 the area is expanded to to 1 million hectares covering protection forest IUPHHK-HA in West Sulawesi, with the intent of minimizing leakages. This concept is attractive to financial institutions in Australia, but was delayed because of the UNFCCC conference in Copenhagen (2009) and Cancun (2011) did not give good results for REDD carbon market. In 2010, the concept of the sources of funding from financial institutions was converted into private investment. This concept is currently being prepared because REDD does not provide certainty.

REDD income is not the main aspect, but investment in planting activities, wood industries development, and community development has become important aspects in the calculation of its financial viability. It is planned to plant 50.00 hectare of damaged LoA to guarantee industrial wood availability and to protect virgin natural forest. With that acyivity, it is estimated to lower GHG emission as much as 13 million t.$CO_2$e.

#### 5.2.2.4. Strategy on Area Management for Small Scale Forest Enterprise

Strategy chosen by small-scale forest enterprise that is sustainably managed are (1) enter the scheme to mitigate climate change through voluntary carbon market, or 'VCM' but the compensation should be higher than the mandatory schemes (A / R CDM) or REDD + which is not mandatory for Annex-1 countries. Option on this scheme is based on short term community needs to meet the needs of everyday life. Another strategy for small-scale forestry enterprise, among others (2) subsidizing small scale SFM to get a certificate because of very limited financial ability, (3) integrate the goal of developing livelihoods and poverty reduction with the goal of conservation (for example, combining conservation with development projects), and (4) REDD + for medium – good value SFM management. Technically, it needs strategy (5) clarify the rights of forest carbon through forest rights reform, particularly through the provision of access to legal permit for communities and entrepreneurs of small-scale forest enterprises to do business in forestry.

Strategies for small-scale forest enterprise which are not sustainably managed include (1) selecting PI mitigation schemes that can provide quick income, especially schemes for carbon sequestration ('CS') or maintain carbon stocks (through conservation measures, combined with forest development projects). Another strategy is needed to gain recognition in reducing GHG emissions and enhance forest carbon stocks, namely (2) provide guidance to the people who will enter climate mitigation schemes, (3) assist process of getting certification by providing subsidies. Restoring forest ecosystems is not only done by large-scale forest enterprises, but also is required by small-scale forest enterprises under this category (4) restoration of forest ecosystems and proposing schemes that help financial liquidity, (5) cooperate (collaborate) with investor to repair and restore small scale production forests, (6) streamline SFM costs for climate change mitigation and weak management needs strategy of (7) applying multilevel organization and multi actors to be more accountable, and the imposition of clear sanctions on the agreements made by those who collaborate. History of successful management of small-scale forest management is shown by the Educational Forest at Gunung Walat, under the Faculty of Forestry, Bogor Agricultural Institute in preserving forests and sustainable management for small-scale forest management, which is in an area of 359 hectares in Box 8, and People Forestry (HR) in the District Gucialit, Lumajang (East Java) in Box 4.

#### 5.2.2.5. Strategy on Area Management for Non-Forestry

The chosen strategy in the area management for non-forestry managed in a sustainable manner are (1) enter the scheme to mitigate climate change through the voluntary carbon market, ('VCM') but the compensation should be higher than REDD + which is not mandatory for the countries in Annex-1. The A / R CDM scheme which is usually associated with low-carbon development (low emission) could enter mandatory market as plants grow fast and have a high content of lignin pellets (bio-energy) as a "green products". The option of the scheme was based on the short term need of companies in the industry to supply fuel as a substitute for coal for power generation or other purposes.

Other strategies are among others (2) subsidize PHMBL certification process for HR or small scale ecosystem restoration for individual or community and at the same time to get

voluntary certificate because of very low financial ability, (3) integrate target for community livelihood development and poverty eradication with target for community empowerment. For this, following strategies are needed (4) clarify security of work area for managers of people forest (HR) or restore ecosystem for securing work area, and (5) clarify forest carbon rights through reformation of land rights existing within Area for Other Uses (APL).

**BOX 8**

## Gunung Walat Education Forest as a Model of Sustainable Small Scale Forest Management in Support of Climate Change Mitigation

**Gunung Walat Education Forest (HPGW)** covering 359 hectares of state forest allocated for special purpose (KHTK) in 2005 by the Minister of Forestry, managed by the Faculty of Forestry, Bogor Institute of Agriculture. Its vision is "To realize HPGW as a media for implementation of higher education *"tridharma"* of the Faculty of Forestry with international standard for Sustainable Forest Management". Dimension of the management is integrated, namely governance of forest resources, manage Tridharma services, and social governance. HPGW tries to apply the concept of sustainable forest management for small-scale forest without felling trees but by relying on non-timber forest products (NTFPs) and environmental services. The concept of SFM is attempted in a true sense so that in the long term the SFM will support the Sustainable Management of Forest (SMF).

Since 1968 the area is an enclave of neglected land, most are covered by shrubs and open land surrounded by villages and community gardens. Up to year 1980 the whole area has been planted with agatis (*Agathis lorantifolia*), pine (*Pinus merkusii*), puspa (*Schima wallicii*), African wood (*Maesopsis eminii*), mahogany (*Swietenia macrophylla*), rasamala (*Altingia escelsa*), sonokeling (*Dalbergia latifolia*), meranti (*Shorea sp*), gamal (*Gliricidae sp*), sengon (*Paraserianthes falcataria*), and mangium (*Acacia mangium*) by students and communities around it. Result of inventory in year 2011 shows that HPGW has a wood potential of 398.55 $m^3$/ha (or a total volume of 143.079,45 m3), biomass potential of 198,32 ton/ha (or a total of 71.196,88 ton), and a potential of carbon reserve of 93.21 ton/ha (or a total of 33.462,39 ton C).

Currently, HPGW has developed into a model of small scale forest area management which is independent and sustainable, with non timber forest product (NTFP) base and environmental services. Income for HPGW in year 2011 reached Rp 2,6 billion , of which 54% is from NTFP and 46% from environmental services. The main activities are for facilitating education and training. Financially, HPGW is able to detach itself from dependency on government funding or the faculty institution, it has even able to contribute to the implementation of Tridharma activities with Rp 200 million/year for students, pupils, and the general public. These activities provide assurance that (1) sustainable management of forest does not need to be for big scale enterprise only, (2) the economic value of forest outside wood can be relied for supporting sustainable forest management (SFM) and sustainable management of forest (SMF), and (3) conservation/ecology and economy are not contradicting matters, but can be harmonized through rightful design.

Meanwhile, the management strategy for non-forest areas that are not sustainably managed include (1) selecting PI mitigation schemes that can provide quick income, especially schemes for carbon sequestration ('CS') or maintain carbon stocks (through ecosystem restoration actions outside the forest area, combined with development projects). Scheme that can be considered is REDD +, VCM, A / R CDM, and UDI in the pattern of PDR. Another strategy is needed to gain recognition in reducing GHG emissions and increase carbon stocks, namely (2) provide guidance to the people who will enter PI mitigation schemes, or businessmen other than forestry, (3) assist the process of obtaining a certificate by providing subsidies to the manager of HR or who restore ecosystem. Concessions under this category, is not only done by large-scale forest enterprises but also require to be done by small scale enterprises as well (4) restore forest ecosystems and propose schemes that help financial liquidity, (5) collaboration with investor to improve and restore area for non-forestry through land rehabilitation measures, (6) streamline costs of PHBML for PI mitigation, and (7) delineate boundaries of the area so as to have a definite legal power to clarify carbon rights.

## 5.3. Funding Incentive Pattern for Climate Change Mitigation

The incentive patterns are explained in Sub-chapter 5.2 for management strategies in each area in accordance with its function. The above strategies have not included funding pattern according to climate change mitigation schemes. The following explains the pattern of funding in climate change mitigation in the effort to reduce emission, increase forest carbon stock and maintain forest carbon.

### 5.3.1. Concepts of Funding Incentive Pattern

Figure 6 shows the Concepts of funding incentive pattern in sustainable forest management according to its function in climate change mitigation to improve and maintain forest carbon stock (Nurochmat, et al. 2011). Sustainably managed forest has the function as a “warehouse” of forest commodities and services. Forest carbon stock was calculated based on business as usual-baseline (BAU-Baseline) in Chapter 4 which is the result of forest resource valuation according to its function. Related to climate change mitigation, forest that are managed sustainably can function as (1) storing of forest carbon stock, (2) sequestration of carbon, (3) producer of green products, and (4) prevention of GHG emission. Planting activities and maintenance of forest carbon can increase forest carbon stock. Management that do not practice tree harvesting at the same time simultaneously is called as carbon based forest management.

Basically carbon trade market pattern can refer to payment environmental services (PES), liability rules (LR), and purchasing development right (PDR) pattern. The three patterns can act as outlets for funding incentives related climate change mitigation in sustainably managed forests, such as A/R CDM (Aforestation/Reforestation - Clean Development Mechanism), REDD+, VCM (Voluntary Carbon Market), DNS (Debt for Natural Swap), UDI (Upstream – Downstream Incentive) and other schemes. The said disbursement of funds can happen if after transaction has occurred based on through agreements and rules applied on site to get an actual green benefit. Example of application of incentive container of funding in

the form of DNS can be followed in the example of Forest Ecosystem Restoration (RE) at Katingan (Central Kalimantan) in Box 9.

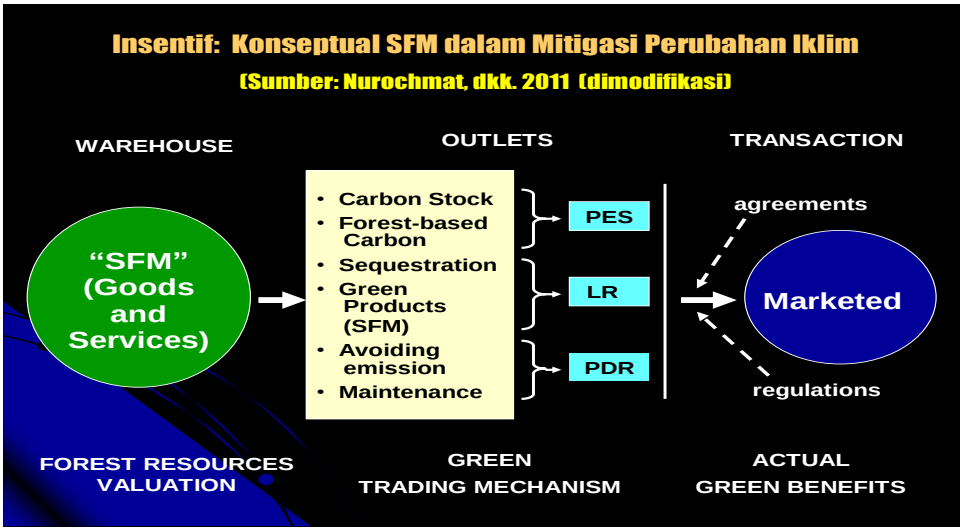



Figure10. Concepts of SFM in climate change mitigation and pattern of containing the funding incentives

PES concept in international carbon trading of protected forest and forest conservation is a service of forest carbon storage (carbon stock), and not a carbon sink, so for PES, the concept of additionality is not relevant to apply. With the concept of PES, the area for the protection of natural forests and peat lands, and areas for conservation still has the opportunity to obtain funding from international carbon trading, although there is no additionality of carbon sequestration. Management objectives are not the only two areas of forest-based carbon, but other objectives such as water regulator, barriers to erosion and flood hazards, as well as micro-climate control is a goal which have enormous significance for the salvation of the impact of climate change. The practice of application of the concept of PES in protected forest of Sungai Wain, Balikpanan Municipality (East Kalimantan) is considered to represent the pattern (Box 1).

The concept of LR is associated with the provision of certain compensation payments by the party responsible for any loss arising from an activity, such as pollution. In the context of carbon trading, LR is congruent with the concept of carbon offsetting scheme through the A / R CDM, REDD +, VCM, and other schemes. LR concept should be prioritized for domestic carbon trade through regulatory intervention and environmentally friendly package of fiscal policy (including through the mechanism of environmental taxes and subsidies). Transfer of right of LR pattern is carbon sequestration (additionality) should be prioritized for rehabilitation of degraded land, or planting in degraded forest areas.

**BOX 9**

## Potential Forest Ecosystem Restoration as an Absorber, Storage, and Forest Carbon Stock Maintenance through Funding Pattern of Debt for Natural Swap

Restoration of the ecosystem (RE) of forest in Indonesia has a high potential as a carbon sink and maintenance of forest carbon stocks. PT. Ecosystem Restoration Indonesia (REKI) IUPHHK-RE managing natural forests covering 52,170 hectares (SK. 193/2007 of the Minister of Forestry) in South Sumatra Province, and 46,385 hectares (SK. 327/2010) in Jambi Province. Restored plant are among others Ironwood (Eusideroxylon swageri), Balam (Palaquium rostratum), Jelutung (Dyera costulata), Tembesu (Fragrea fragrans), surian (Toona sinensis), and arean (Arenga pinnata) from 444 existing species. Potential of forest carbon stocks in forests in both RE sites are approximately 8,623,563 tons of C ≈ 31,648,474.38 tons of $CO_2e$. Animals species found are birds as much as 293 species, 55 species of mammals, 26 species of amphibians, 38 reptile species. The number of animals in REKI shows the recovery of forest ecosystems with biodiversity will be realized with various restoration efforts.

In principle, the purpose of ecosystem restoration is to restore the life support functions such as with moratorium on permits, protection, enrichment, cultivation, utilization of non-timber forest produce, and activities that provide social and economic benefits. 38% of forest cover is in the form of higher secondary forest, 27% are medium secondary, 23% lower secondary, and 12% open area. The low secondary forest and open areas are especially in need of rehabilitation and enrichment planting. Restoration of forest ecosystems through IUPHHK-RE have not been able to contribute an equivalent benefit as IUPHHK-HA, in particular for the government in the form of state revenue from taxes and non-tax revenues because the company's ability to earn income from the business is still low.

Therefore, to still be able to restore the forest ecosystem, fund is then necessary to restore the forest. It is possible to borrow money from another country (for example industrialized countries), in addition to offset carbon it can also be done with debt relief (Debt for Natural Swap-DNS). The activity is being conducted by the Kahati Foundation to rehabilitate degraded forest through the DNS scheme.

PDR is the concept of "buying the right to build" or the amount of compensation to be given to owners of resources for certain public purposes. According to the concept of PDR, the government may prohibit the owner of the forest to cut down for some reason, and the government must provide compensation to owners of forest resources because it does not do logging in the area. In this case, transfer of rights as the compensation given is because they have made possible the prevention of carbon emissions arising from business activities, construction, or conversion of forest land for certain socio-economic objectives. PDR requires a pattern of compensation and should be applied to areas that have strategic value, such as along the borders between countries, forest for production function, conversion of forest areas that have high economic potential outside forestry, or forest areas close to settlements or economic centers, has a good infrastructure to support economic growth.

### 5.3.2. Strategy Allocation of Funding Incentive Pattern According to Climate Change Mitigation

Strategic allocation of financial incentives directed in accordance with the directives according to area function (RKTN, 2010), which are areas for conservation, protection of natural forests and peat lands, areas for land and forest rehabilitation, areas for large scale forest enterprises, and areas for small scale forest enterprises, as well as for non-forest areas (Table 15).

Application of outlet concept on the "green trade" mechanism need clarity in benefit distribution. Government as regulator should be able to regulate the distribution of these benefits, especially to compulsory market scheme, while the voluntary market mechanisms can be delivered through business to business (B to B). However, the mechanism of B to B does not necessarily mean that it could able to be executed freely, but can be done through a trust fund (non-government). International markets may have a discretion that is not tied to the government in the country where project is located and are not even tied to schemes that exist in Figure 11, for example, Project Indonesia - Australia is not ready to enter the REDD / REDD + in Natural Forest in Mamuju (West Sulawesi ), or Japan - Indonesia and Korea - Indonesia in building "green products" in Indonesia.

Some climate change mitigation schemes that have adopted the A / R CDM, REDD +, and VCM. REDD + (a + modified the REDD scheme whose implementation will be aligned with patterns of utilization of space and funding). As for schemes such as DNS and UDI can be attributed to climate change mitigation. The pattern of funding (PES, LR, and PDR) will accommodate or facilitate any financial incentives for a certain schemes agreed or by regulation, both from the domestic (unilateral) and international (bilateral and multilateral).

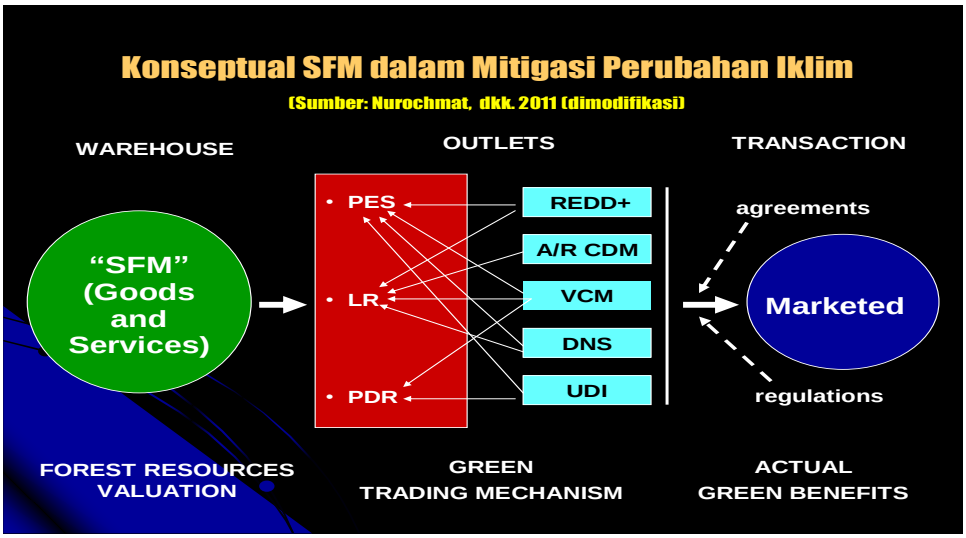



Figure 11. SFM Concept in Climate Change and Funding Pattern

The following are financial incentives in the pattern of climate change mitigation in accordance with the direction of forest functions. The pattern of funding which is allocated are PES, LR, and PDR, and climate change mitigation schemes include REDD +, UDI, VCM, DNS, and A / R CDM. There are certain schemes which are not relevant when applied to spatial patterns in a particular region.

Table 15. Funding Incentive Pattern on Climate Change Mitigation According to Directive on Function of Forest Area.

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| Area Function | Pattern of Land Use | Funding Pattern | Climate Change Mitigation Scheme |
|---|---|---|---|
| Area for Conservation | Area for Carbon Stock, ('CS') | PES | REDD+ (modified), UDI, VCM, and DNS. |
| | Area for Carbon Sequestration, ('CSq') | LR | Not relevant |
| | Avoiding Emission, ('AE') | PDR | REDD+ (modified), UDI, VCM, A/R CDM. |
| Area for Natural Forest Protection and Peat Land | Area for Carbon Stock (CS) | PES | REDD+ (modified), UDI, VCM, and DNS. |
| | Area for Carbon Stock (CS) and green product ('GP') | LR | A/R CDM, VCM, UDI, and DNS. |
| | Area for Carbon Emission Avoidance (AE) | PDR | REDD+ (modified), UDI, VCM, A/R CDM. |
| Area for land and forest rehabilitation | Area for Carbon Stock (CS) | PES | Not relevant |
| | Area for Carbon Sequestration (CSq and green product 'GP') | LR | A/R CDM, VCM, and DNS |
| | Area for Carbon Emission Avoidance (AE) | PDR | A/R CDM and VCM. |
| Area for Large Scale Forest Enterprise | Area for Carbon Stock (CS) | PES | REDD+ (modified), VCM, and SFM (HCVF). |
| | Area for Carbon Sequestration (*CSq and green product 'GP'*) | LR | A/R CDM, VCM, REDD+ (SMF), SFM (GP), and DNS |

| | | | |
|---|---|---|---|
| | Area for Carbon Emission Avoidance (AE) | PDR | REDD+ (modified), A/R CDM and VCM. |
| Area for Small Scale Forest Enterprise | Area for Carbon Stock (CS) | PES | REDD+ (modified), VCM, and SFM (HCVF - Partnership). |
| | Area for Carbon Sequestration (*CSq and green product 'GP'*) | LR | VCM, REDD+ (SMF), SFM (GP-Partnership), A/R CDM, and DNS |
| | Area for Carbon Emission Avoidance (AE) | PDR | REDD+ (modified), A/R CDM and VCM. |
| Area for Non-Forestry | Area for Carbon Stock (CS) | PES | Not relevant |
| | Area for Carbon Sequestration (*CSq and green product 'GP'*) | LR | REDD+ (modified), VCM, A/R CDM, and DNS |
| | Area for Carbon Emission Avoidance (AE) | PDR | REDD+ , A/R CDM and VCM. |

Source: Nurochmat D.R., Widyantoro B., and Tiryana T. (2011)

**Explanation Table 15:**

(1) REDD+ (*Reducing Emission from Deforestation and Forest Degradation*);
(2) REDD+ (modified = REDD+ scheme which implementation is adapted with area spatial use and funding pattern);
(3) A/R CDM (*Aforestation/Reforestation for Clean Development Mechanism*);
(4) VCM (*Voluntary Carbon Market*);
(5) DNS (*Debt Natural Swap*);
(6) UDI (*Upstream-Downstream Incentives*);
(7) SMF (*Sustainable Management of Forest*), consist of REDD+, conservation role, SFM, and enhancement of carbon stock;
(8) SFM (*Sustainable Forest Management*);
(9) GP (*Green Product*);
(10) CSq (*Carbon Sequestration*);
(11) CS (*Carbon Stock*);
(12) AE (*Avoiding Emission*).

# Bab 6 CONCLUSION AND RECOMMENDATION

## 6.1. Conclusion

The conclusion to be drawn from the strategy of enhancing and maintenance of forest carbon stocks through sustainable management in forests with a variety of actions as mentioned in the chapters of the study are as follows:

(a) The strategic environment as an enabling condition factor greatly affects the performance of enhancing and maintaining carbon in forests through sustainable forest management in Indonesia;

(b) Reducing emissions from deforestation through forest fire prevention strategies and the encroachment of forests, combating illegal logging and illegal mining, and regulation of forest area use and release to change the designation and functions of forests;

(c) Reducing emissions from forest degradation through logging quota setting strategies, and conservation and restoration of natural protection forest, including management of highly selective peat lands;

(d) Increasing carbon stocks through planting strategies in the community forest and the village forest, forest and land rehabilitation at the watershed, industrial forest plantation and people plantation forests, ecosystem restoration, forestry partnership, while creating green products from a variety of actions that support climate change mitigation schemes;

(e) Managing forests through forest management strategies with intensive silviculture techniques (Silint), Indonesian Selective Cutting and Planting and Reduced Impact Logging (RIL), and certification of the Sustainable Forest Management. Specifically to encourage the certification is done by a gradual process of obtaining certification for large-scale forest enterprises, while for small-scale forest enterprises by giving subsidy to the community who manage the forest;

(f) To maintain forests through Silint technical strategy, TPTI, RIL, and certification of PHL /PHPL, as well as improving the welfare of the community with a variety of related measures to mitigate climate change, primarily by providing access and capacity building in small-scale forestry;

(g) REDD + institution, trust-fund that manages the finances associated with financial incentives to mitigate climate change, Forest Management Unit (FMU) is very efficient and effective in efforts to reduce emissions, improve and maintain forest carbon stocks through sustainable management of forest in Indonesia .

Schemes to mitigate climate change, such as REDD +, Voluntary Carbon Market (VCM), Aforestation / Reforestation in Clean Development Mechanism (A / R CDM), Upstream and Downstream Incentive (UDI), and Debt Natural Swap (DNS) can lower GHG emissions, absorbing / storing forest carbon. Application of each of these schemes should not be used for all functions of forests. In addition, to improve the criteria of policies and strategies that meet the criteria of 3E + (effective, equality, efficient, and has added benefit), then the efforts to preserve biodiversity (High Value Conservation Forest, HVCF) and utilize produce of non-timber forest on all functions of the forest into the strategy in the implementation of climate change mitigation schemes. Thus, the ultimate goal can be achieved through strategies that increase the value and sustainability of forest ecosystem function.

## 6.2. Recommendation

Recommendations that can be given to national policy and strategy as input to increase and maintain forest carbon stocks through sustainable management of forest in Indonesia is as follows:

a. In the strategy to improve and maintain forest carbon through sustainable management of forest in Indonesia, the role of each function of forest management unit in forest areas has the initial need to do data collection (forest inventory). Especially on IUPHHK, it can be done by the method of comprehensive and periodic forest inventory (IHMB);

b. Institutional incentives related to funding and the Forest Management Unit or KPH (Conservation, Protection, and Production) should be given priority to the establishment and strengthening of human resources that are reliable, and serves to foster and control of any climate change mitigation measures in the forestry sector;

c. Encourage the functioning of IUPHHK management unit (large and small) which are able to manage the forest with a good performance in mitigating climate change by getting the financial incentives to improve and maintain forest carbon stocks, especially on plantation forest which is capable of absorbing large amounts of carbon compared to other forests;

d. Management of forests for conservation and protection of natural forests and peat lands for carbon storage function of forests should be maintained with the involvement of communities in and around the forest, as well as by providing incentives in the form of integrated programs that provide primary and ancillary benefits;

e. The process of certification of sustainable forest management (SFM) should be increased related to the mitigation of climate change, especially small-scale forest enterprise should get a subsidy because of their less able capacity.

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## FORESTRY AND PEAT LAND IN SUSTAINABLE FOREST MANAGEMENT (SFM)

Carbon emissions reduction target (26%): 0672 (Giga tons) of $CO_2$-e and increase carbon stocks through the expansion of planting area
Carbon emissions reduction target (41%): 1039 (Giga tons) of $CO_2$-e and increase carbon stocks through the expansion of planting area.

**Policies** to support RAN GHGs in sustainable forest management:

1. Decrease GHG emissions while increasing comfort, preventing disasters, employment, and increase people's income, corporate, and state;
2. Improve forest management by assisting the development of sustainable forest management certification in natural production forests, timber plantations (HTI, HTR, HKm, HD, and HR) and non-wood (HD / HAd. and HKm), and ecosystem restoration by a third party ;
3. Increase carbon stocks through increased productivity and efficiency in the management of natural production forests, timber plantations (HTI, HTR, HKm, HD, and HR), and restoration of ecosystems with the lowest possible emissions and optimal sequestration of $CO_2$;
4. Develop incentives to increase carbon stocks in forests that have been logged, burned, and damaged

**Strategy**:

1. Meet the prerequisites, enabling conditions, and the reform of the forestry sector development through a variety of measures that reduce emissions and increase carbon uptake in sustainably managed forests;
2. Reduce emissions of carbon sources through the forests and peat lands through sustainable forest management;
3. Control of forest encroachers, illegal logging (illegal logging and mining), and forest fires;
4. Maintaining carbon stocks through safeguarding the forest from illegal logging, encroachment and forest fires, and increased uptake of carbon through the act of enrichment planting in natural forests and planting crops in the plantation forest;
5. Conscientiously implement the certification of sustainable forest management on forest conservation, protection forest and production forest (natural forest and plantation forest), as well as community forests (HTR, HKm, HR, HD / HAd.);
6. Using environmentally friendly logging techniques (reduced impact logging, 'RIL') on the practice of sustainable forest management;
7. Apply intensive silviculture (SILINT) in sustainable production forest management;
8. Using instruments Free, Prior and Informed Consent (FPIC) for local and indigenous communities in and around forests that are managed sustainably;
9. Increase the additional benefits through high conservation value forest in natural forest area that are managed sustainably;

10. Provide incentives to companies and communities in sustainable forest management that builds on the growing areas of critical land;

The policy has been and will be taken should meet the criteria of 3E +, namely effectiveness, efficiency, equality, and additional benefits. These criteria are general criteria for assessing options and outcomes, and is more widely used to assess climate change mitigation policy options. Additional benefits (+)is aimed for policies that reduce poverty and conserve biodiversity or high conservation value forests (Angesen, 2011).

The principle underlying the formulation of the strategy is the principle of sustainable development, namely: (i) economic development based on responsible decentralization, (ii) maintenance of ecological balance and function, and (iii) intergenerational equity (Task Force of REDD +, 2010). In line with these principles, sustainable forest management embraces the principle of sustainable development through three aspects: economic, social, and environmental impacts on each of the functions of forests (conservation, protection, and production).

The action plan drawn up as the translation of climate change mitigation actions in sustainable forest management as policies and strategies to reduce GHG emissions, improve and maintain forest carbon stocks according to directives areas for specific functions (RKTN, 2011). The said area include: (i) areas for conservation, (ii) areas for the protection of natural forests and peat lands, (iii) areas for rehabilitation, (iv) area for large-scale forest enterprises, (v) area for small-scale forest enterprises, and (vi) non-forest areas. Thus the plan of action to mitigate climate change through sustainable forest management in a certain region is prepared with reference to the area in accordance with these directives.

Each region can be in one or more functions of forests, namely (i) for the conservation area is located just on the conservation of forests, (ii) areas for the protection of natural forests and peat lands are in protected forest and forest production forest (fixed and finite), (iii) rehabilitation of the area is to be in conservation forests, protection forests and production forests (fixed and finite), (iv) areas for large scale forest enterprises is in production (fixed and finite), (v) the area to be small-scale forest in production (fixed and finite), and (vi) to non-forest areas outside the forest. In the analysis of the national strategy, as the translation to reduce greenhouse gas emissions, improve and maintain forest carbon stocks through sustainable forest management for each function of the forest with a variety of directives of areas for such purposes.

Table Annex1. Action plan to reduce emission and increasing carbon stock in sustainable forest management until year 2030

| Policy | Strategy | Action Plan | Indicator | Responsibe Institution |
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| Decrease GHG emissions while enhancing good governance, comfort, preventing disasters, employment, and increase people's income, corporate, and state forest areas for all forest area referrals. | Meet the requirements through a variety of measures that reduce emissions and increase carbon uptake of forests and peat lands through sustainable forest management (SFM) | • Development of Nationally Appropriate Mitigation Action (NAMAs) in forestry through SFM;<br>• Develop a national strategy for emission reduction schemes and increasing forest carbon stocks through SFM;<br>• Establish a National Coordinating Agency for REDD + (compliant), and other agencies (voluntary);<br>• Develop a macro plan adaptation and mitigation of climate change (PI) in forestry and peat land through SFM; | • Arrangement of NAMAs in Forestry through SFM;<br>• Compiled Stranas for CDM, VCM, REDD+ schemes through SFM;<br>• Establishment and functioning of the National Coordinating Agency for REDD +, and sub-national (KPHP), including the trust fund for the VCM;<br>• Macro-plans formulated, regulations and legislation related to mitigation of PI; | • Ministry of PPN /Bappenas in coordination with Ministry of Forestry;<br>• REDD+ taskforce, Coordinating Economic Minister Office, Ministry of PPN/Bappenas, Ministry of Finance, Ministry of Forestry;<br>• REDD+ taskforce, Coordinating Economic Minister, Ministry of Finance, Office of PAN Ministry and Bureaucracy Reformation;<br>• Ministry of Forestry, Ministry of PPN/Bappenas |
| | Meeting enabling conditions through a variety of actions that reduce emissions and increase carbon uptake through sustainable forest management | • Maintain and protect the working area from changes in spatial policy and forestry;<br>• Reform the planning through the completion of data and spatial information, particularly biophysical and socio-economic data in areas of forest management;<br>• Accelerate the establishment / strengthening of the working area of forest management through | • Changes in the production forest area managed by the forest was minimal (<10% of the total forest area according to function);<br>• Availability of biophysical, socio-economic data & information, and technology; | • Office of the Economic Minister Coordinator, Ministry of Public Affairs, Ministry of Forestry, Regional Gov'ment, DPR/DPRD;<br>• Ministry of Forestry in coordination with Environment Minister Office; |

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| | | participatory processes. | • The PHL work area has been confirmed 80% of the total area of forest management. | • Ministry of Forestry in coordination with Regional Government / Other Institutions; |
| | Reform law enforcement for SFM abuses | • Enforce the law firmly and consistently against the abuses committed in the work area of forest management and Community-Based Forest Management (CBFM);<br>• Establish a special judge who will decide the case on violation of PHL environment;<br>• Enables investigators to prevent deforestation and forest degradation. | • No administrative, civil, and criminal violations in the forestry sector.<br>• Special judge appointed and functioning.<br>• PPNS able to investigate forest destroyer. | • Ministry of Justice & Human Rights, the Attorney General, State Police Affairs, Ministry of Forestry;<br>• Ministry of Justice & Human Rights<br>• Ministry of Justice & Human Rights, State Police Affairs, Ministry of Forestry; |
| Lowering emission of GHG and at the same time increasing good governance comfort, preventing disasters, increase employment, and increase people's income, corporate, and state forest areas for all forest area referrals. | Apply good forestry governance related to adaptation and climate change mitigation | • Reform land use, tenure and access;<br>• Building capacity to support services through SFM;<br>• Reform forestry institution and formation of FMU (KPHK, KPHL, dan KPHP) and functionalize them in relation to climate change mitigation;<br>• Determine scenarios for REL and MRV;<br>• Build framework for legislative work in forestry related to decrease of GHG emission, increase and | • Clarity of local rights on land and carbon;<br>• Increase service capacity;<br>• Role and responsibility and service increases and SFM is formed;<br>• REL is determined and MRV system is built;<br>• Determination of regulation on RAN-Mitigation of climate change in forestry through SFM;<br>• Availability of MRV methodology. | • Ministry of Forestry, Regional Government, Head of National Land Use Agency;<br>• Ministry of PAN and Bureaucracy Reformation, Ministry of Forestry;<br>• Ministry of PAN and Bureaucracy Reformation, Ministry of Forestry; Ministry of Internal Affairsi;<br>• REDD+ Taskforce, Ministry of PPN/Bappenas in coordination with Ministry of Forestry; |

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| | | maintenance of carbon stock through SFM;<br>• Build and develop method of climate change mitigation in forestry through SFM. | | • Ministry of Forestry;<br>• REDD+taskforce, Ministry of PPN/ Bappenas, Ministry of Forestry; |
| | Community empowerment through management of people forest and increasing security of land tenure and access to forest resource. | • Reform land use, tenure and access of communities to manage people forest;<br>• Measure profit from carbon trade that can be predicted;<br>• Create a number of regulations about access and capacity enhancement of community forest which is explicit that can be applied.<br>• Involve communities in MRV, and forest inventory. | • Clear borders of community forest;<br>• Flow of profit from carbon trade enterprise predicted;<br>• Availability of regional regulation that support access and capacity increase of communities in forest management<br>• Community is involved in MRV & forest inventory. | • Ministry of Forestry, Regional Government, National Land Use Agency;<br>• Ministry of Finance in coordination with related ministry / institution, including *trust fund*<br>• Ministry of Forestry, Regional Government.<br>• Ministry of Forestry, independent institution; |
| Improve forest by aiding certification development of SMF in conservation forest, protection forest, natural production forest, industrial forest plantation (HTI, | Lower the cost of forest repair and the process of acquiring SFM certification for all functions of forests (which can be done in stages | • Provide budget from APBN/ APBD to repair forest and acquiring SFM certificate, specifically for HK and HL;<br>• Provide subsidy for small scale forest enterprise managed with low intensity;<br>• Facilitate and accompany process of gradual attainment of SFM for managers of community forest and HA/HTI | • Availability of budget from APBN/APBD;<br>• Availability of subsidy for certification of community based forestry;<br>• Availability of companion in process of gradual attainment of SFM certification | • Ministry of Forestry and Regional Government;<br>• Certification institution for *voluntary*<br>• Ministry of Forestry for mandatory certification, and certification institution for voluntary. |

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| HTR, HKm, HD, and HR) and non-wood (HD/HAd. and HKm), and ecosystem restoration by third party. | Equalize mandatory certification and voluntary that have adopted standard to measure climate change performance (e.g.: Standard Climate Alliance, Climate, Community and Biodiversity Alliance, 'CCBA') | • Build equalized criteria and indicator for mandatory and voluntary certification that have adopted PI standard, community and biodiversity;<br>• Certify wood legality (LK) and other forest products for multiplier of carbon emission reduction;<br>• Build standard assessment for SFM performance for all forest function | • Existence of equalized mandatory and voluntary certification that has adopted PI standard, communities and biodiversity;<br>• Certified wood legality;<br>• Existence of standard performance assessment of SFM in all forest function. | • Ministry of Forestry (LPI), Voluntary Certification Institute (FSC and LEI)<br>• Ministry of Forestry in coordination with Voluntary Certification Institute |
| Increase & maintain carbon stock through rehabilitation, productivity & efficiency, and tending in management of conservation forest,<br>Protection forest, natural production forest, forest plantation (HTI, HTR, HKm, HD, and HR), and ecosystem restoration with lowest emission and absorb $CO_2$ optimally; | Rehabilitate forest area for conservation and natural forest protection and peat land | • Tree planting in degraded area (critical) in protection forest and conservation forest;<br>• Maintain plants at degraded area in conservation forest and protection forest. | • Planting at degraded area is done;<br>• Planted trees at degraded area is taken care of | • Ministry of Forestry dan Regional Government;<br>• Ministry of Forestry dan Regional Government |
| | Improve/rehabilitate forest with proper silviculture techniques at natural forest allocated for large and small scale forest enterprises; | • Apply Silint silviculture technique;<br>• Need application of environmentally friendly logging technique (RIL);<br>• Enrichment planting and planting with Silint technique;<br>• Facilitating use of reforestation fund through loan scheme to implement Silint; | • Availability of Silint technical guidelines;<br>• Logging techniques with RIL is applied;<br>• Enrichment / planting with intensive silviculture is done;<br>• Loan from reforestation fund for Silint application is channeled; | • Ministry of Forestry;<br>• Ministry of Forestry, holder of IUPHHK-HA;<br>• Holder of IUPHHK-HA ;<br>• Ministry of Forestry. |
| | | • Accelerate granting of IUPHHK-HT and RE;<br>• Planting empty HT area / shrub or | • Process to get HTI permit is faster (maximum 105 days);<br>• HTI area becomes much | • Ministry of Forestry<br>• Ministry of Forestry and holders of IUPHHK-HT |

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| | Accelerate/area increase for industrial forest plantation; | degraded and peat land with depth of < 3 meter.<br>• Build conflict resolution mechanism of plantation forest (HT) to fix carbon rights;<br>• Build plant innovation for new energy and renewable energy; | wider (minimum 18 million hectare until year 2030);<br>• Decrease in conflict of land use and utilization of forest resource at forest plantation;<br>• Plants for new energy and renewable energy is being used. | • Ministry of Forestry dan IUPHHK-HT holders;<br>• Ministry of Forestry, Ministry of Energy and Human Resource |
| | To develop the building of community based forestry | • Accelerate getting business permit for HTR, HKm, and HD/HAd;<br>• To ease flow of distribution of wood and non-wood forest product from people forest with simple wood administration;<br>• Involve communities in developing mechanism of conflict resolution related to reformation of land use right; | • More extensive area for HTR, HKm, HD/HAd;<br>• Simplified wood administration for common people;<br>• Community is involved in making mechanism of conflict resolution. | • Ministry of Forestry, Regional Government;<br>• Ministry of Forestry;<br>• Ministry of Forestry, and Regional Government. |
| | Safeguard, maintain, and increase carbon stock from forest management for RE | • Protect/safeguard, conserve natural forest area for RE (IUPHHK-RE) for carbon based forest management;<br>• Enrich plants in the area of IUPHHK-RE;<br>• Plant in degraded area of IUPHHK-RE in collaboration with communities inside and outside forest area; | • RE forest area safeguarded to defend carbon reserve from deforestation and degradation;<br>• Number and extent of enriched area increases in the IUPHHK-RE area;<br>• Number and extend of planted area in IUPHHK-RE by collaboration increases; | • Ministry of Forestry, communities inside and around IUPHHK-RE forest area ;<br>• Holder of IUPHHK-RE permit;<br>• Holder of IUPHHK-RE permit and communities; |
| | | • Control illegal logging and mining within forest area;<br>• Promote RIL; | • Illegal logging/mining inside forest area is controlled;<br>• RIL is enacted;<br>• Logging intensity reduced; | • Ministry of Forestry, IUPHHK management;<br>• IUPHHK management;<br>• Ministry of Forestry, IUPHHK |

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| | To stop the cause for damage and let the forest to grow again in a natural way or aided by enrichment planting | • Decrease logging intensity through reducing cutting quota;<br>• Reduce damage by grazing,<br>• Prevent forest fire;<br>• Control competing species with the species that is to be restored.<br>• Enrich plants within the IUPHHK.area | • Minimum damage caused by grazing,<br>• No occurrence of forest fire;<br>• Competing species could be controlled.<br>• Enrichment planting grows | management;<br>• IUPHHK holder and forest manager;<br>• IUPHHK holder and forest manager;<br>• IUPHHK holder and forest manager.<br>• IUPHHK holder and forest manager. |
| Develop financial incentives and carbon trading to the actors that improve and maintain stock or carbon stock in forests that have been logged, burned, and damaged.<br>. | Build incentive funding mechanism in line with each climate change mitigation scheme | • Specify climate change mitigation scheme through SFM (REDD+, VCM, A/R- CDM, UDI, and DNS)<br>• Specify funding mechanism incentive for climate change mitigation actor in forest management in line with the forest function through SFM;<br>• Implement bilateral and multilateral cooperation;<br>• Channel funding incentive for actors that do PI mitigation through government budget (APBN/ APBD) and mobilization of funds through CSR; | • Enactment of PI mitigation scheme, compulsory as well as voluntary;<br>• Enactment of incentive mechanism for PI Mitigation;<br>• Implementation of bilateral and multilateral cooperation<br>• Channeling of funding incentive; | • Ministry of Forestry dan Regional Government;<br>• Ministry of Finance;<br>• Government (President of RI) and related Ministries;<br>• Climate Change Mitigation Funding Body; |
| | Build up national as well as international carbon market (compulsory and voluntary market) | • Enact regulation on voluntary carbon trade or *carbon off-setting*, (mechanism and profit distribution);<br>• Promote potential of carbon sequestration/carbon stock through SFM. | • Enactment of voluntary carbon trade;<br>• Implementation of forest carbon trade through carbon trade; | • Ministry of Forestry;<br>• Forest managers; |

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| Reformation of community land rights and increase community income from forestry enterprises outside of forest area | Accelerate implementation of national certification program for proprietary right and right to utilize for development of HR, HKm, HD/HAd | • Make inventory about land controlled by communities (individual or communal);<br>• Implement land measurement involving related parties;<br>• Publish certificates simultaneously for proprietary and utilization rights for small scale forest enterprises. | • Available accurate data and information on land owned by communities;<br>• Involvement of related stakeholders in the implementation of land measurement;<br>• Issuance of Proprietary and Utilization Rights on land; | • BPN and Regional Government;<br>• BPN and Regional Government;<br>• Regional BPN |
| | Build up people forest (HR) and provide incentive to HR actor who enhance and maintain carbon storage in non-forestry area | • Help in spreading plant seeds and the building of People Forest (HR), to individual as well as to community (village or traditional);<br>• To do guidance and extension for managers of HKm, HD/HAd, be it for wood on non-wood product from non-forest areas; | • The spread of plant seeds and the development of HR;<br>• Development of HKm, HD/ HAd individually or by communities; | • Ministry of Forestry, Regional Government, and Holder of IUPHHK and Business Permit for Primary and Advanced Forest Product Industry (IUIPHH);<br>• Regional Government; |

Table Annex 2. Management strategy for **large scale production forest enterprise with SFM** in lowering GHG emission and increasing carbon stock

| External \ Internal | **Strength:** | **Weakness:** |
|---|---|---|
| | • Internationally acknowledged as a practice of sustainable forest management;<br>• Able to prevent deforestation and forest degradation, and other social pressures;<br>• Has the high potential to absorb and store carbon (production forest as a "warehouse") through actions in planting/enrichment;<br>• Concession holder has received business permit with PHPL certificate;<br>• Fund available for forest restoration with slight degradation.<br>• Able to apply innovative development integrated with climate change mitigation scheme | • Unable to prevent deforestation and forest degradation, especially from external factors;<br>• Managers have not understood climate change mitigation schemes and low participation;<br>• Very burdensome to finance and acquire PHPL certificate due to poor management,<br>• No or very small implementation of PHPL which apply *reduced impact logging* (RIL),<br>• Company has difficulty in meeting the requirements of A/R CDM, and REDD+ scheme is complicated;<br>• Low awareness about forest fire. |
| **Opportunity:**<br>• Have opportunity on open carbon market for all PI mitigation schemes (REDD+, A/R CDM, and VCM);<br>• Very extensive forest area: PHPL-HA have opportunity to get funding incentive compared to HTI;<br>• PHPL-HA and HTI in peat land has very good opportunity compared to mineral land;<br>• Funding incentive from REDD+ is available, while VCM and A/R CDM is limited;<br>• Small capability in applying innovative forest development integrated with climate mitigation schemes. | **Strategy (S – O):**<br>• Prioritize mandatory market which give compensation or higher pay for performance result;<br>• Accelerate enactment of production forest to confirm forest carbon rights for concession holder;<br>• Improvement and restoring forest is directed at degraded production forest area;<br>• Implement innovation with Silint techniques and build up new energy and renewable energy;<br>• Modify standard assessment for PHPL performance related to climate change mitigation, and adjusted to international standard. | **Strategy (W – O):**<br><br>**NOT APPLICABLE** |

| **Threat:** | **Strategy (T – S):** | **Strategy (T – W):** |
|---|---|---|
| • Formation of a national institution in line and related is ongoing which affect local governance that has not found stability;<br>• Mechanism of funding incentive and profit distribution is unclear, and procedure for environmental services is complicated and long bureaucracy;<br>• Sensitive to leakages because of pressures from outside forestry sector, and forest fire danger;<br>• Very difficult to comply with criteria for "*additionality*" for PHPL, and low participation;<br>• Ample strength in tug of war for interest of forest land use for other sector. | N O N E | N O N E |

Table Annex 3. Management strategy for **large scale production forest enterprise without SFM** in lowering GHG emission and carbon stock increase

| External \ Internal | **Strength:**<br>• Internationally acknowledged and highly recognized to have aims for alleviation of poverty and received support from traditional community and regional participation;<br>• Slightly able to prevent deforestation and forest degradation, and other social pressures, and presence of some measures of forest safeguard-ing for prevention of outside pressure;<br>• Has high potential in carbon absorption through planting activities in highly degraded area;<br>• Forest concession holders still hold business permit and put effort in improving and increasing carbon reserve through PHPL;<br>• Have fund reserve, although a little for extension of business permit. | **Weakness:**<br>• Unable to prevent deforestation and forest degradation, especially from external factors;<br>• Managers have not understood climate change mitigation schemes, and awareness to participate;<br>• Very burdensome to finance and acquire PHPL certificate due to poor management,<br>• Managers of HKm, HD, and HTR have difficulties in complying to requirements of A/R CDM, and REDD+ scheme is complicated;<br>• Community based forestry (HKm, HD, and HTR) have low ability to manage forest;<br>• Low awareness on forest fire; |
|---|---|---|
| **Opportunity:**<br>• Have opportunity in open carbon market for all schemes of climate change mitigation (REDD+, A/R CDM, and VCM);<br>• Very extensive area of forest: PHPL-HA has the opportunity to get funding incentive compared to HTI;<br>• PHPL-HA and HTI on peat land have very good opportunity compared to mineral;<br>• Funding incentive from REDD+ is available, while VCM and A/R CDM is limited;<br>• Little ability to apply innovative forest development integrated with climate | **Strategy (S – O):**<br><br>N O N E | **Strategy (W – O):**<br>• Could enter voluntary market even though with compensation or paying performance with lower value;<br>• To do gradual certification for large scale forest entrepreneur to enter carbon market;<br>• Adoption of logging technique with RIL and increasing capacity on it implementation;<br>• REDD+ for large scale PHPL with poor value or in the process of improving performance to acquire certification;<br>• Clarify tenure right especially for small scale forest enterprises, and security of work area for |

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| change mitigation scheme. | | large scale entrepreneur;<br>• Firm law enforcement and consistent for actors of *illegal logging* and forest fire. |
| **Threat:**<br>• Formation of a national institution in line and related is ongoing which affect local governance that has not found stability;<br>• Mechanism in funding incentive and profit distribution is not yet clear, and procedure for environmental services permit is complicated and long bureaucracy;<br>• Very sensitive about *leakages* because of pressures from outside forestry sector, and forest fire;<br>• A little difficult in meeting the criteria of "*additionality*" in PHPL, and low participation;<br>• Very strong tug of war for interest in forest land use for other sectors. | **Strategy (T – S):**<br><br>N O N E | **Strategy (T – W):**<br><br>N O N E |

Table Annex 4. Management strategy for **small scale production forest enterprise with SFM** in lowering GHG emission and increasing carbon stock

| External \ Internal | **Strength:** | **Weakness:** |
|---|---|---|
| | • Internationally acknowledged and highly recognized to have aims for alleviation of poverty and received support from traditional community and regional participation;<br>• Able to prevent deforestation and forest degradation, and other social pressure (appreciation/honor for tenure);<br>• Have lower potential in carbon absorption, but high carbon stock (production forest as carbon "warehouse" karbon) through planting in slightly degraded area;<br>• Concession holders have business permit and have PHPL certificate, more efficient and effective manager;<br>• Availability of fund to improve slightly degraded forest. | • Managers have not understood climate change mitigation schemes, and awareness for participation;<br>• Felt that cost for getting PHPL certification is relatively expensive;<br>• Managers of HKm, HD, and HTR have difficulties in complying with the requirements of A/R CDM and complicated REDD+ scheme;<br>• Limited ability to withstand land need pressures from various interests for land use and forest resource utilization;<br>• Community based forest (HKm, HD, and HTR) have low ability to manage forest;<br>• Low awareness on forest fire. |
| **Opportunity:**<br>• Open carbon market especially for REDD+, while limited for VCM and A/R CDM;<br>• PHPL-HTR, HKm, and HD has very good opportunity for funding incentive compared to large scale HA and HTI which have failure in SFM management;<br>• PHPL- HTR, HKm, and HD on peat land has more opportunity than on mineral land; | **Strategy (S – O):**<br>• Able to enter voluntary market although with compensation or paying performance with lower value;<br>• Subsidized small scale PHPL that has SFM to attain certificate;<br>• Application of logging practices with RIL and enhancing implementation capacity, and increase additional benefit in the form of non-wood produce;<br>• REDD+ for PHPL with poor – medium value; | **Strategy (W – O):**<br>N O N E |

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| • Bonus on funding incentive for REDD+, while A/R CDM and VCM available but limited;<br>• Applied *Millenium Development Goals* (MDGs) related with climate change mitigation. | • Clarify tenure rights especially for small scale forest enterprise, and work area security for large scale forest enterprise; | |
| **Threat:**<br>• Formation of a national institution in line and related is ongoing which affect local governance that has not found stability;<br>• Could lead to degradation "the tragedy of the commons" in HTR, and HKm;<br>• Unclear mechanism of funding incentive and profit distribution, simple procedure but long bureaucracy;<br>• Very sensitive to the existence of leakages caused by pressures from outside forestry sector;<br>• Sensitive to corruption, mismanagement, and politicking, and low participation;<br>• Tug of war of various interests in forest land use for other sectors. | **Strategy (T – S):**<br>N O N E | **Strategy (T – W):**<br>N O N E |

Table Annex 5. Management strategy for **small scale production forest enterprise without SFM** in lowering GHG emission and increasing carbon stock

| External \ Internal | **Strength:**<br>• Internationally acknowledged and highly recognized to have aims for alleviation of poverty and received support from traditional community and regional participation;<br>• Low ability in preventing deforestation and forest degradation, and other social pressures, and existence of forest safeguarding for prevention of outside pressure;<br>• Have potential in high carbon uptake through planting activities in highly degraded land area;<br>• Concession holder still hold business permit and exert effort to improve and increase carbon stock through PHPL;<br>• Has fund reserve, even though small for extension of business permit. | **Weakness:**<br>• Unable to prevent deforestation and forest degradation, especially from outside pressure;<br>• Managers have not understood climate change mitigation schemes, and awareness to participate;<br>• Very burdensome to fund and acquire PHPL certificate because of poor management;<br>• Managers of HKm, HD, and HTR have difficulties in complying with the requirements of A/R CDM, and complicated REDD+ scheme;<br>• Community based forest (HKm, HD, and HTR) have low ability for forest management;<br>• Ease in changing forest use for activities in non-forestry sector;<br>• Low awareness for forest fire; |
|---|---|---|
| **Opportunity:**<br>• Carbon market open for REDD+, A/R CDM, and VCM schemes;<br>• PHPL-HTR, HKm, and HD has good opportunity in getting funding incentive compared to large scale HA and HTI which have failed in SFM management;<br>• PHPL- HTR, HKm, and HD on peat land has good opportunity compared to mineral land;<br>• Available financial incentive from REDD+, while it is limited for VCM and A/R CDM;<br>• Implement *Millenium Development Goals* | **Strategy (S – O):**<br>N O N E | **Strategy (W – O):**<br>N O N E |

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| (MDGs) related to PI mitigation. | | |
| **Threat:**<br>• Formation of a national institution in line and related is ongoing which affect local governance that has not found stability;<br>• Could lead to degradation "the tragedy of the commons" in HTR, and HKm;<br>• Unclear mechanism of funding incentive and profit distribution, simple procedure but long bureaucracy;<br>• Very sensitive to the existence of leakages caused by pressures from outside forestry sector;<br>• Sensitive to corruption, mismanagement, and politicking, and low participation;<br>• Tug of war of various interests in forest land use for other sectors. | **Strategy (T – S):**<br>N O N E | **Strategy (T – W):**<br>• Accompany communities entering climate change mitigation scheme;<br>• Aid the process of certification by providing subsidy;<br>• Restore forest ecosystem and propose a scheme which help in financial liquidity;<br>• Collaborate with investor to restore small scale production forest;<br>• Streamline PHPL cost for climate change mitigation scheme;<br>• Implement multi stakeholder organization to be more accountable, and law enforcement;<br>• Spatial arrangement in small scale forest enterprise with clarity and definite legal force of law;<br>• Diversify forest enterprise which is not against climate change mitigation;<br>• Clarify forest and carbon rights through confirmation of work area. |

# Draft National Strategy On Enhancing And Maintaining Forest Carbon Stock Through Sustainable Forest Management Activities: A Strategic Assessment

MINISTRY OF FORESTRY

I T T O

**RED-PD 007/09 Rev. 2 (F)**

Enhancing Forest Carbon Stock to Reduce Emission from Deforestation and Forest Degradation through Sustainable Forest Management (SFM) Initiative in Indonesia

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