CONSOLIDATION REPORT

REDUCING EMISSIONS FROM DEFORESTATION AND FOREST DEGRADATION IN INDONESIA

Ministry of Forestry of the Republic of Indonesia
2008

LIST OF TABLES AND FIGURES

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EXECUTIVE SUMMARY

Deforestation degradation and climate change

According to IPCC Fourth Assesment Report, 2007, emissions of Greenhouse Gases (GHG's) have increased since the mid-19th century, and are causing significant and harmful changes in the global climate. Higher emission levels are producing sea level and climate that will dramatically affect billions of coastal people, the quality of the global environment and the capacity of countries to sustain future economic expansion.

Moreover the report stated that since the pre-industrial era, the concentration of atmospheric carbon dioxide (CO_2) has expanded by 35%, approximately 18% of which is due to deforestation and the degradation of forests. About 75 % of this has been from the developing countries of Brazil, Indonesia, Malaysia, Papua New Guinea, Gabon, Costa Rica, Cameroon, Republic of Congo and Democratic Republic of Congo, which have large areas of tropical forest. FAO Forest Resource Assesment 2005, stated that an alarming 13 million hectares of tropical forest are lost per year, while a further 7.3 million hectares per year suffer various degrees of degradation. Global emissions from land use, land use change and forestry have reached 1.65 Gt Carbon per year.

While developed countries grapple with the challenge of reducing their high emissions through new technologies and clean development, tropical countries can contribute substantially to mitigation by choosing economic development pathways less dependent on the conversion of forests. In September 2007, the President of Indonesia initiated a declaration of the world's major tropical rainforest nations to reverse forest loss, but emphasized the need for support from developed countries through capacity building, research and development and technology transfer, as well as new and additional financial resources.

The drivers of deforestation must be removed but new international markets and new protocols are also necessary. As is the case with many other environmental services of forests, such as biodiversity or the regulated production of clean water, the lack of a tangible financial market for the reduction of forest-related emissions of GHG gases has meant that tropical countries are not compensated for reducing deforestation and forest degradation. As there are presently no regulated financial markets for valuing and trading the carbon retained in forest ecosystems, conventional forest products or alternative land uses remain potent incentives for deforestation.

This document lays out a process by which Indonesia can prepare for involvement in the REDD Compliance Carbon Market which is expected to emerge after the Kyoto Protocol matures in 2012.

Historic deforestation in Indonesia

Indonesia has a long established framework of forest land use which forms the basis for its forest resources and land use planning. And a framework within which improved forest management might be implemented.

Forests are divided into the categories of *Protection Forest* which are concerned with maintaining hydrological protection/functions , such as water management; Conservation Forests; which are primarily concerned with biodiversity conservation, ecological processes and nature-based tourism and Production Forests, including natural production forests, industrial plantation forests and forest areas which may be converted to other land use categories outside the forest estate. These uses include estate crops such as oil palm, agriculture and settlement. Over the last three years the Ministry of Forestry has been increasingly concerned with improving public access to forest land and promoting community based forest resource management through classifications including: collaborative management of protected areas; Community Forests; Community Forest Plantations and Customary Forests. These land use zones are designed to increase the economic stake which local people may have in the national forest estate and to thereby

promote greater levels of community based forest protection as a means of combating illegal logging and reducing deforestation and forest degradation.

The international REDD initiative

Carbon credits associated with REDD are different from A/R CDM: they derive not from growing new trees but from *avoiding deforestation* and reducing the size of the carbon stock lost as the biomass of forest ecosystems is degraded.

The REDD system will achieve much higher investment rates than A/R CDM projects because of the fundamental differences in the way carbon levels in the atmosphere are reduced. A/R CDM projects sequester carbon from the atmosphere and deliver temporary carbon credits. REDD projects avoid emissions of carbon into the atmosphere by conserving existing carbon stocks. They are therefore similar to CDM energy projects, which deliver permanent emissions reductions.

The carbon credits generated under a REDD scheme are a consequence of how well new approaches to forest and forest land management succeed in diminishing unnecessary or unplanned carbon loss in comparison to a defined baseline. REDD is a means of providing countries with the financial incentives to retain their forests, by using stored carbon as the natural resource supporting economic development.

REDD is not directed at stopping the use of forests for timber, nor of stopping planned conversion of forests to other economic uses. REDD represents a way to value the natural resource of carbon so that it can be considered along with other conventional forest resources, when land use and forest use decisions are made.
Indonesia, as a leader of a coalition of 18 Rain Forest Countries hosted the UNFCCC 13th Convention of the Parties (COP 13) in Bali in December 2007 and has accepted responsibility to bring to the discussions of REDD substantial technical analyses of what would be required to implement the REDD concept in a post-Kyoto international protocol.

REDD in Indonesia and the IFCA Process

By conservative estimates, if Indonesia could halve its recent annual rates of forest loss, the estimated value of carbon credits is between $ 2.5 and $4.5 billion per year. REDD market income for verified reductions in deforestation could assist existing forest industry plans to double the size of the pulp and paper industry from 6 million to 12 million tonnes; to more than double exports of palm oil from the current $ 3.75 billion to something in the order of $ 7 billion a year; and to sustain an expanded timber industry which currently generates about $4 billion a year.

The investment cost of a broadly based integrated land use program which maximize Indonesia's tradable forest carbon resources is estimated in excess of $10 billion between 2008 and 2012. REDD-related financial resources could make a very significant contribution to meeting the costs to be faced by provincial and district government administrations, and by the pulp paper, oil palm and timber industries, during the transition period before adequate additional plantation and oil palm resources come on stream. REDD-related incomes could also support a substantial investment in peat land restoration and broadly-based, rural and village level forest enterprises. Such an investment could result in alternative and sustainable livelihoods for many of Indonesia's 10 million lowest income families who currently survive on uncontrolled harvesting of forest and expansion of slash and burn agriculture.

Indonesia formed the *Indonesian Forest Climate Alliance* in July 2007, to analyze how a REDD scheme could operate as a practical carbon emission reduction mechanism. The IFCA is a forum/umbrella for communication/coordination/consultation of stakeholders working on forest and climate changes in Indonesia. The IFCA is coordinated by the Ministry of Forestry, consisted of governments, private sectors, civil societies, scientific institutions and interntional partnerss. . The IFCA process in 2007 was supported by governments from Australia, Germany and the United Kingdom under the coordination of the World Bank. Nine working groups were brought together to produce technical working papers between August and December 2007. A total of 60 national and international experts in all aspects of forestry and climate change have participated in the preparation of technical papers which address the elements of the *supply*

chain necessary to produce carbon credits from REDD project activities. The process has involved writing workshops and extensive stakeholder consultation. IFCA outputs were integral parts of the material presented for discussion by the Ministry of Forestry at a parallel event at UNFCCC COP13 on the 6-7 December 2007

The REDD Supply Chain

The production of a REDD carbon credit requires a series of steps that will operate at the national level and sub-national levels of government. REDD can be as a tool to integrate efforts in managing forest resources in a sustainable manner at all levels. The steps include:

1. The development of an organizational/ management infrastructure capable of:
   - setting a baseline against which annual emissions can be measured ;
   - The capacity to monitor the changes with sufficient precision to deliver confidence and quality to the tradable carbon credits;
   - A structure through which the sale of carbon credits could be managed
   - A structure by which income from the trade in carbon credits can be distributed to those agencies or groups responsible for achieving the reductions.
2. The identification of those activities, or organizational and industry changes necessary to achieve a reduction in emissions; and
3. The development of a carbon market system capable of handling the trade, especially recognizing the nature and source of potential buyers.
4. A system of forest governance that ensures that law is enforced; that systematic issues of governance such as transparency is addressed and that carbon transactions are safeguarded.

The progression of steps represents a system and all steps need to be achieved in order to produce tradable credits.

Developing the Infrastructure: setting the REL and monitoring changes

The UNFCCC definition of ***Forest*** includes all land with woody vegetation consistent with national standards for canopy cover, canopy height and area. It also includes vegetation that could potentially reach, the threshold values used by a country to define the Forest. Forest includes lands covered with mixed species natural forests and plantations of single species for A/R CDM. Indonesia defines forest as woody vegetation covering greater than 0.25 ha with a potential to reach a minimum of 5 m and a crown cover of greater than 30%.
When crown cover falls below the designated minimum land is classified as non-forest. If this is only a temporary change, such as for timber harvest with regeneration expected, the land remains classified as forest. This definition could be applicable to REDD but negotiation is still required.

The UNFCCC Decision 11/CP.7 defines ***deforestation*** as *the direct, human-induced conversion of forested land to non-forested land.*

Deforestation causes a change in land cover and generally a change in land use, although the subsequent land use often is not detectable from remote sensing imagery. Common changes include: conversion of forests to annual cropland, conversion to perennial plants (oil palm, shrubs, short-rotation pulpwood plantations), conversion to slash-and-burn (shifting cultivation) lands, and conversion to urban lands or other human infrastructure.

When long term direct human-induced changes persist in a forest, cause a loss of forest carbon or other values but do not reduce canopy cover below the defined threshold of what is forest, ***degradation*** has occurred.

The thresholds for loss in carbon stocks, long term, and minimum area affected need to be specified to operationalize this definition. Degradation would represent a measurable, sustained, human-induced decrease in carbon stocks, with measured tree cover remaining above the minimum required to be considered forest. Conversion of native forests with high carbon stocks to plantations with lower carbon stocks would meet this definition for degradation—a plantation, likely to meet the definition of a forest in any country, is a human-induced, persistent loss in a significant amount of carbon. The technological requirements to monitor degradation directly are either not generally available or prohibitively expensive for routine use. Indirect approaches that could be used are described in the document.

Carbon emissions from deforestation and forest degradation may be estimated from either ***gross*** or ***net*** changes in carbon stocks

Gross emissions assume removal of trees and most of the biomass and that all carbon is emitted. It does not include any reductions for the carbon sequestered in the vegetation of the replacing land use. *Net emissions* assume removal of trees and most of the biomass and that all stored carbon is emitted, but allows for counting the carbon stocks on the area deforested as they are replaced. Since carbon stock is monitored annually for REDD in the year when deforestation occurs *gross* and *net* carbon emissions will count as the same. In subsequent clear-felling of plantation forest blocks *net* and *gross* carbon emissions will also be the same, although lower than in the initial clearing of the natural mature forest. This situation has lead to some controversy among forest managers who believe that the measurement of gross emissions is an unfair penalty which cannot be redeemed through subsequent sustainable forest plantation management. A better analysis of *net* versus *gross* deforestation is to consider the more tangible issue of what the level of planned deforestation will be within the context of national and regional strategic economic development, taking into account the *Net Present Value* (NPV) resulting from evaluation of the stored carbon market resource. The projected changes in forest cover which optimize the total land resources can then be eliminated from a projected baseline.

IPCC Guidelines concerning REDD focus on reducing *gross emissions*. Throughout the report, emissions reported are *gross emissions* from deforestation. Emissions from degradation have not been considered as they did not result in the removal of the tree canopy below the threshold level considered for forest.

The ***Reference Emission Level*** (REL) is the baseline against which reductions in emissions are measured. It is a function of forest area change combined with the corresponding carbon stocks of the forests being deforested or degraded.

A REL may be established by (i) taking an average of past conditions over an agreed time frame; (ii) modeling based on unplanned (unsanctioned) activities and planned land use to meet development goals over a specified time frame; or a mixed REL where emissions from planned and unplanned drivers of deforestation and degradation are considered differently and separately. In this case, emissions from *unplanned* activities are measured against a REL based on historical unplanned emissions, or an average of historical emissions. Each approach has implications which need to be evaluated in the Indonesian context.

The mixed approach to setting the REL appears most appropriate to the Indonesian situation; however it does present specific challenges. .Projection of the pattern and rates of deforestation are likely to be more challenging than the associated estimation of carbon stocks and subsequent estimates of emissions. Estimates of carbon stocks for the REL could be improved with minimal effort and capacity, whereas projecting deforestation rates requires more technical capacity.

Forest maps will be required for two time points, whether for recording historic emissions or for developing a modeling approach. In the example given in this report, the Time 1 map was the forest/nonforest map for the year 2000; annual maps for each year 2000-05 were developed with the period ending in 2005 (Time 2).

Decisions have yet to be made as to what time periods will be selected for developing the REL. For Indonesia, the best remote sensing data for forests are available for 2000 onward.

The map representing Time 2 could serve as a starting point for developing a benchmark map against which future changes in forest area and corresponding emissions could be measured. However, to produce the level of accuracy required for such a benchmark map requires the use of high resolution data in those places where deforestation causes small clearings (not picked up by MODIS) and detailed ground validation of the imagery. A concerted effort must be made to accurately map peat swamp forests so that any changes in them can be well monitored into the future.

Timber production from native forests is an important activity in Indonesia and is also a source of CO2 emissions. Timber harvesting is captured under forest degradation—that is reduction in carbon stocks in *forests remaining as forests*. Currently, there is no REL for forest degradation in Indonesia. Therefore Indonesia is missing out on opportunities to engage fully in REDD by not having the data and estimates of the historic emissions for this activity. The challenge then for Indonesia is to have the capacity to quantify the emissions from timber harvesting activities

Monitoring and verification

Under a REDD mechanism, countries will need to show credible reductions in emissions from deforestation and degradation, measured against the baseline at specific intervals in time (e.g. annual or bi-annual). Monitoring will show the success of REDD policies and interventions, which will make possible a translation of emission reductions into carbon credits.

The IPCC provides some guidance on the land use changes that could be monitored, a scheme that Indonesia may wish to adopt. Thus, the 2006 IPCC Guidelines for National Greenhouse Gas Inventories for Agriculture, Forestry and Other Land Uses (AFOLU) and the 2003 IPCC Good Practice Guidance for Land Use, Land Use Change and Forestry (GPG-LULUCF) are constructed around six land uses, and the conversion between those land uses:

- Forest Land Converted to Crop Land
- Forest Land Converted to Grass Land,
- Forest Land Converted to Settlements, and
- Forest Land Converted to Other Land

are commonly equated to **deforestation**.

- Forest Land Remaining Forest Land potentially encompasses forest **degradation**

The IPCC recognize three potential ways to track area changes:

- Approach 1 identifies the total net area change for each land category, but does not provide information on the nature and area of conversions between land uses. As this approach only identifies the net change in forest area, it is unsuitable for monitoring deforestation.
- Approach 2 involves tracking of land conversions between categories. Under Approach 2, the counterbalance effects of areas of reforestation and deforestation are identifiable.
- Approach 3 extends Approach 2 by using spatially explicit land conversion information; thus allowing for an estimation of both "gross" and "net" changes in land categories.

Approach 3 is the only one that can be used for REDD implementation.

With respect to emissions factors, there are five main types in-forest C pools (aboveground biomass, belowground biomass, dead wood, litter, and soil), with a sixth (harvested wood products) under discussion. Deforestation and degradation can also emit non-CO2 gases, which have a higher global warming potential than CO2, from decomposition and biomass burning. The IPCC reports include methods

for estimating the emission factors for all these pools and gases. Which of these pools and gases will be included for REDD remains to be negotiated.

The assessment of emission factors for the various carbon pools can be carried out at different levels of uncertainty or "Tiers", with Tier 1 being probably insufficient to satisfy REDD needs. Indonesia may begin with Tier 2 which is expected to be sufficient for commencing engagement, and then systematically institutionalize approaches towards Tier 3 which is more complex and models transfers and releases among carbon pools that more accurately reflect how emissions are realized over time.

To enhance readiness more technical data about the variability of Indonesia's forest is required. The National Forest Inventory (NFI) should be revived and more plots added for forest types under most threat These extra data would improve the accuracy and precision of estimates.

There is little to no data on other carbon pools specific to Indonesia. For example, conversion of forest to non-forest results in losses of soil carbon but data for estimating this source of emissions for Indonesia is lacking. Further data are needed to improve the emission factors for draining and burning peat when peat swamp forests are deforested. For example, data on CO_2 emissions from peat swamp forests is needed to determine how emissions vary as a function of the conversion process such as ditching and draining to varying depths. Emissions from fire in peat swamps are based on one study, and more studies are needed on the depth of peat that is consumed in a fire

Forests should be classified into classes that have significance for carbon measurements and can be distinguished from or linked to satellite or aerial imagery.

No experience exists in monitoring and measuring areas of degraded forests on a regular basis in Indonesia and little data exist on the impacts of harvesting on carbon stocks. To develop a monitoring system for forest degradation would require training and testing of these methods in Indonesia and the acquisition of more detailed satellite data and air photos. A challenge for Indonesia is to quantify the relationships between harvesting practices and CO_2 emissions. Such data could be used to investigate how timber extraction practices might be changed to reduce CO_2 emissions from this activity.

Carbon Market Structure

At this point in time there is uncertainty about how a carbon credit market for reduced emissions from deforestation will be established. There is a large number of possible arrangements for the REDD carbon market depending on the type of international agreement that is finally reached in this respect. Fundamental questions in this respect are yet to be answered, including:

1. Whether an agreement is in fact reached at the international level or whether, in its absence, a voluntary market would spontaneously develop?
2. Assuming an international agreement, whether the financial mechanism will be based on a fund or the creation of a regulated international market for trading carbon credits?
3. Whether credits will be "fungible" with other types of credits in carbon markets, or whether there will be an exclusive protocol for REDD credits?
4. Whether REDD payments will be made to national governments or directly to other entities at the sub-national level?
5. What reference scenario will be used for computing credits and releasing payments. Indonesia will not lone determine the detailed form that will emerge for the international transactions mechanism. It could though, explore this issue in more detail, weighing the advantages and disadvantages of the various options, with a view to influencing the eventual design of such mechanism.

Payment Distribution Mechanisms

An effective REDD mechanism requires that appropriate rewards accrue to those that undertake initiatives that reduce deforestation and associated emissions. If these payments do not reach the agents who have a

direct influence on forest-cover and carbon-stock change, a REDD scheme will not create the incentives needed to reduce emissions.

The design of the Indonesian national REDD payments system will involve decisions over:

1. Financial transfer mechanisms at different scales;
2. Revenue allocation;
3. Forms of payment and timing;
4. Legal and other institutional structures; and
5. Risk management options.

The first issue that needs to be decided is who will be the "sellers" and who would be responsible for the financial allocations. Regarding the first question, taking into account relevant regulations, there are two options:

1. Transactions would take place with the central government;
2. Transactions would be carried out with lower government levels or directly with projects. With respect to the second issue, redistribution of funds can take place in three ways:
   (i) Following the government administration hierarchy: National <> Provincial <> District government <> Village;
   (ii) Based on management of forest functions: National <> National forestry authority <> Local forest management units;
   (iii) Domestic project-based with the nation as re-seller on the international market: National authority <> Project entities <> local actors.

The advantages and disadvantages of these combinations are reviewed; however, there is still a need to reach a decision on which will be adopted, what their institutional demands would be and what would be the transaction costs of each.

There are several options to organize the allocation of revenues to different entities. These allocation issues will be vital for the central government to resolve, regardless of how transactions may take place between international and national levels.

With regard to the forms of payments, several options have been explored in detail. These include whether payments to main actors should be in the form of a lump sum, or staged over time; whether to individuals or groups, or whether on a cash or non-cash basis. A resolution of what mechanisms would be preferred is needed taking account of the effectiveness and efficiency levels that can be achieved in each case and the transaction costs that are likely to materialize.

The legal framework to regulate the various options is complex. Existing legal frameworks will influence both fund-based and market-based approaches to REDD, particularly where financing is incorporated into the state budget. Revenue Sharing Funds (DBH), General Allocation Funds (DAP), and Special Allocation Funds (DAK), are examples of revenue sharing between national and sub-national government entities and are likely to play a role in allocation decisions. Regulations related to decentralization of roles and authorities of forest governance will also play have a major influence in the design of REDD mechanisms.

With regard to risk, there are three types:

1. Governance risks (e.g. low transparency, accountability and high levels of corruption, or the risk that the national government will reverse policies related to REDD);
2. Permanence and leakage risks at national and project level; and
3. Project risks, especially those related to unclear land ownership and associated conflict

Several options to deal with these risks, including increased transparency in allocations and the use of independent auditors and monitors, have been analyzed.

The mechanism for compensation within Indonesia's borders will depend on what international transfer arrangement is agreed upon, for example whether it would entail payments to national government or to sub-national levels of government. The details of a precise architecture of a payment distribution mechanism will have to wait for a decision on what will be the international standard. On the other hand, payments to actors within Indonesia will require a definition of what criteria will be followed to allocate financial amounts, whether they will be strictly determined on the basis of carbon credits produced by those that avoid deforestation or whether other criteria such as poverty alleviation will enter into the equation. There is also the question of whether payments will flow through state budget allocations or whether an independent and transparent financial system needs to be created, and the specifics of the profile of payments over time and over geographical areas. These questions and others have already been explored in some detail but additional analytical work is needed to provide concrete answers that would serve as a basis for the creation of a scheme for distributing payments.

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Deforestation Reduction Strategy Options

A series of priority strategy recommendations have been developed for each of the major forest sector land uses: these are summarized in the table below and apply to protected areas, including conservation forest and protection forest; Production Forest including natural forest, plantation forest and convertible forest. There is also a focus on the oil palm sector as a major expanding use of converted forest land and also peat soils which are used for plantation forest, for oil palm and for conversion to other non-forest uses. The focus on peat soils reflects not only the high level of soil carbon storage and the extent to which they contribute to the total carbon emissions from the country; but also to the complexity of introducing management responsibility for decision making which extends across sectors of government and also levels of government.

While the strategic recommendations call for a number of significant and positive actions to be taken to reduce carbon emissions, almost all are already encompassed in legislative or policy frameworks governing the aspirations of the forest sector. Many of the recommendations are also contained in goals and objectives of the Ministry of Forestry's Long Term Development Plan 2006-2025. REDD provides the potential to introduce not only the incentives to take these actions, but also the financial resources to fund them.

Forest Function	Recommended Strategy Initiative

Protected Areas (KK and HL)	1. The development of a revised national conservation strategy. 2. The development of a professional and sufficient management structu 3. The confirmation of boundaries and the completion of the legal gazettal process
Production Forests	1. Review the production forest function units to accommodate changes in the areas of forest vegetation in support of decentralized government responsibilities, including • A review of the ecological conditions associated with each forest unit to determine its continuing conformity with the original function; • A review of the condition of *open access* production forest land; • Review opportunities to secure land access among local people and potential for collaborative land use involving HTR projects 2. Reduce the flow of illegal logs into the market, by • Enforcing laws against illegal logging • Creating alternative log supply • Re-structuring wood products sector 3. Review management practices in production forest units to optimize REDD opportunities, by • The provision of incentives to achieve stipulated *outcomes* of management rather than compliance to prescribed actions • The use of performance bonding • The provision of incentives for practices reducing carbon emissions • Supporting adoption of accountable 'sustainability targets' • Supporting collaborative management arrangements between forest concession companies 4. Capitalize on the opportunity of the REDD Market instrument to realize planned strategic reform of the pulp and paper industry to achieve a sustainable forest plantation sector, by • Strengthening the criteria for approval of new plantations in Production Forest • Increasing the cost of using MTH and/or restrict its use for pulp production • Regulating the export of wood chips and pulpwood logs • Encouraging carbon-positive pulp and plantation projects by improving due diligence in the financial sector.
Oil Palm	1. Consolidate policy and approval criteria for releasing HPK for oil palm developments 2. Review spatial plans to optimize degraded lands. 3. Intensify production per unit of land. 4. Require zero burning

Peat land	1. Regulate and Restore Water Tables 2. Prevent Fire 3. Build coordination and consistency across government jurisdictions and sectors to control cross boundary impacts of fire (control of sources and control of spread). 4. Regulate further conversion of peatlands and revise and enforce rules for management of existing peatland plantation sites. 5. Implement land swaps where possible to retain high carbon value forest and peats while allocating alternative land for new plantations.

Testing the implementation of REDD

From 2008 the Ministry of Forestry is embarking on a program to test the implementation of REDD in Indonesia through demonstration projects. The guiding principle for this process which has emerged from the IFCA investigation is that all demonstration projects need to be examining how the whole REDD supply chain can be implemented under varying spatial, sectoral and administrative conditions. This will require a multi-sectoral approach emphasizing coordination and collaboration to an extent that that has been rarely attempted, especially in this country. The glue that will ensure its success must come from the common understanding of the fundamental importance to the future of the nation of maintaining the carbon resource as a buffer against the full impacts of disastrous climate change and the loss of the natural ecological life support systems that provide the resilience which the country requires to underpin economic recovery and a safe and equitable future for the population.

In order for a REDD scheme to result in payments for carbon units traded, there are a number of steps that must be fulfilled: These steps have been defined as the *Supply Chain* and consist of:

1. The establishment of a *Baseline*
2. Reductions in carbon emissions achieved against the "Business as Usual" scenario
3. Monitoring and verification of the reductions
4. The accounting of carbon trading units; and
5. The distribution of the payments from the market to the agencies responsible for achieving the tradable carbon credits.

Pilot projects should test how these steps can be undertaken in a way which results in tradable carbon credits under the range of circumstances which this large and complex country presents. The outcome of the demonstration projects will determine:

- Where gaps may lie in information or capacity to obtain information;
- The practicality of implementing management options which reduce emissions in each of the forest use sectors from a technical and economic perspective;
- The practicality of implementing management options at different spatial and administrative scales;
- The quality and permanence of the carbon credits that can be achieved;
- Mechanisms which are just and transparent for the distribution of payments from the market transactions to the agencies (government, business, community or NGO) responsible for the resource management changes.

Based on an analysis of responsibilities of the three strata of government Demonstration Projects should be undertaken at four levels of potential future activity:

- National (for example with land management units managed from national government, e.g., National Parks;)
- Province (Forestry activities in areas that cross districts; e.g., HPH, TAHURA)

- District (Forestry activities that occur within a District (HPH, Community Forest Area, oil palm estate and HTI)
- Project (for example with forest management units such as individual HPH, HTI, Estate crop plantation, or community based HTR.

The nature of ***Payment Distribution Mechanisms*** is the subject of debate as to whether they should be managed at national, sub-national or project level. The IFCA follows IPCC Guidelines and assumes that the monitoring of reduced emissions and subsequent payment distributions to contributing projects will be coordinated nationally. This decision creates a particular consideration for the selection of demonstration projects.

The REDD carbon market in Indonesia will be the responsibility of a national facility monitoring emission reductions,. This body would also manage payment distribution to REDD projects. Because projects in the compliance market will not sell their carbon emission reduction credits the issue to be tested is how to determine, on the basis of national emissions savings, what proportion of the income received from the market should go to each project, based on its size, effectiveness and form.

The pilot phase leading to 2012 provides the opportunity for these formulae to be determined through demonstration projects which have direct relationships with buyers under national coordination guidelines, which should be included in governing regulations. Volunteer project proponents should be selected who represent all industry sectors and all geographical scales. The management practices which they propose can then be tested to determine the degree of emission reduction, with the results providing the basis for subsequent approved management practices when the market is fully operating. This experience could then provide the formulae for allocating emission reduction credits for which approved projects will receive annual reimbursement.

This national **compliance** based system would run independently and parallel to the **voluntary** market which will always be market-based and where remuneration of projects will result from direct trading between project sellers and buyers, a situation which will not occur in the compliance market.

The view of the IFCA analysis is that the minimum spatial scale should coincide with the administrative level of the District in order to reduce the inherent difficulties posed by *leakage* and *additionality*..

At all levels, the new concept of the KPH (Forest Management Unit) as described in the PP6/2006 and amended in PP3/2008, offers the most integrated administrative unit for forest management on the Forest Estate.

Projects selection needs to encompass sectoral uses as reflected in the Strategy Papers:

- Protected Areas, including nature reserves (Cagar Alam) and national parks under *National* jurisdiction; TAHURA under Province jurisdiction; and protection forest (*Hutan Lindung*) under District jurisdiction.
- Natural Production Forests
- Industrial Plantation Forests, especially for the production of pulp for paper production; and
- Oil Palm Plantation

Selection of geographical locations should also allow for the testing of circumstances in forests that are on:

- Peat soils and
- Mineral Soils

With respect to peat soils sites with deep peat should be given priority. These include 12 districts in the provinces of NAD, Riau, Jambi, East Kalimantan and Papua.

To determine the effectiveness of managing encroachment through alternative business development/ community development, site selection needs to encompass locations (Districts) where the access to the forest by neighboring communities is:

- High
- Low

Site selection needs to consider locations where REDD benefits can contribute to a broad range of social and infrastructure improvements, demonstrating the capacity of the new carbon mechanism to address poverty alleviation and opportunity growth, in return for forest stewardship, not encroachment.

Site selection should also consider potential cooperation from forest industries willing to implement improved management through, for example, adopting Reduced Impact Logging (RIL); international benchmark plantation operation; and certification, as a means of testing opportunity cost incentives.

In terms of a national screening of approved demonstration projects, an objective should be the inclusion of regions which:

- Had a high forest cover; but high rates of deforestation;
- Had high forest cover and low rates of deforestation; and
- Had lower forest cover but low rates of deforestation.

Readiness by 2012 will require attention to the infrastructure of delivering carbon credits: specifically concerns relating to the establishment of a baseline an independent monitoring system, a means of selling and accounting for credits and a mechanism for the distribution of payments

Grant programs for technical assistance to achieve readiness are available from a range of multilateral and bilateral contributions under such instruments as the World Bank coordinated Forest Carbon Partnership Facility (FCPF) and pledged support from bilateral donors including Australia, the United Kingdom and Germany. Many of these funds are now available to respond to proposals

The document provides an analysis of potential priority projects which would equip Indonesia with readiness for an estimated $7.5 million.

The implementation of forest sector reforms is not a requirement for readiness but is nevertheless an important component of testing the practical processes involved in implementing a REDD supply chain through demonstration projects. The document has provided an initial analysis of the scale of investments involved in implementing the strategic reforms which will produce substantial reductions in historic emissions. An estimated $4 billion dollars over ten years is proposed as a realistic working figure for which international donor interest can be expected.

THE OBJECTIVES AND STRUCTURE OF THIS REPORT

This consolidating document brings together the findings of the nine Working Groups, plus feedback obtained from internal focus group meetings, the two national workshops and the proceedings of the Bali Conference.

The first objective of this report is to present an account of progress in the process to reach an adequate level of *Readiness* to implement a mechanism to secure funding from the emerging global financial mechanisms for Reducing Emissions from Deforestation and Degradation. The second objective is to provide a basis for discussion with the many agencies who have expressed an interest in supporting Indonesia in this undertaking. The report explores how REDD could work in practice and be fully operational in time for the target start up date for creation of a post Kyoto REDD Carbon Credit Mechanism after 2012. The report sets out a series of actions that GOI could undertake between now and 2012 to ensure that Indonesia could qualify for such carbon payments.

A final objective is to share with the many other countries that have expressed an interest in the REDD scheme, the process Indonesia has followed in developing an understanding of how a REDD mechanism could work. The report places strong emphasis on the potential of REDD not only to slow global warming but also to bring this about in ways that will address poverty alleviation through expanded economic growth and protection of forest carbon and the many other forest-related environmental services.

Following an Introductory section which sets out the international and national context of REDD, the Report is presented in a further five substantive sections which reflect the REDD supply chain.

Section 2 is concerned with the key information required to understand REDD in Indonesia. It provides and overview of the management framework for Indonesia's forests, and what is now known about their distribution, extent and carbon stocks. It also reports on the analyses conducted through the IFCA process on the historic emissions from deforestation between 2000 and 2005.

Section 3 is concerned on what is required to construct the infrastructure necessary to enable a REDD scheme. In this section the document deals with the issue of how to establish a baseline against which to manage emissions reductions; how to monitor and report on the reductions achieved and how to establish a framework to manage the selling of the carbon credits produced and to distribute the earning from such a trade to reward those responsible for producing them. In each of these sub-sections the document sets out the conceptual basis, presents an assessment of the current status of Indonesia progress in relation to the challenges involved in implementation. Finally, each section summarizes what needs to be done in order to achieve the necessary development in infrastructure to achieve *readiness*.

Section 4 is concerned with the measures required to reduce emissions from deforestation and the strategic *investments* required to enable the forest sector to achieve effective reduction in carbon emissions. The section examines the drivers of deforestation – both planned and unplanned before examining the opportunity costs of foregoing business as usual forest sector uses in favor of carbon conserving management. The document presents strategic initiatives for each of the forest sectors: protected areas, natural and plantation production forests and oil palm that would result

in significant reduction in carbon emissions capable of optimizing Indonesian earnings from trade in this resource.

Section 5 deals with the issue of governance. Specifically It considers how the processes of government administration guarantee the quality and permanence of the REDD credits proposed for the market; and how can the forests and land be managed in the decentralized approach to government in Indonesia to ensure consistency of law and policy across a range of government and civil society stakeholders.

Section 6 deals with options for the implementation of demonstration projects in the intervening years prior to 2012. It presents concepts and guidelines, derived from the IFCA analyses that are relevant to defining demonstration projects. It also provides a breakdown of how an integrated approach to access grant and special loan facility funding could be used to position Indonesia for a post 2012 market scenario where investments in industry change could be readily recouped from market returns.

1. INTRODUCTION

1.1 Deforestation, Degradation And Climate Change

It is now widely understood that emissions of Greenhouse Gases (GHG's) that have increased since the mid-19th century, are causing significant and harmful changes in the global climate. Higher emission levels are inexorably producing increasing drought and aridity, destructive floods and storms and rises in sea levels that will dramatically affect billions of coastal people, the quality of the global environment and the capacity of countries to sustain future economic expansion.

The most significant of the GHG's is carbon dioxide (CO_2). Since the pre-industrial era, the concentration of this gas in the atmosphere has expanded by 35%, approximately two-thirds of which is the direct consequence of the use of fossil fuels for energy production. While consideration of this source has been the focus of climate change amelioration to date, the Stern Report in 2005 estimated that more than 18% was due to deforestation and the degradation of forests – a level higher than the proportion due to the global transport sector.

Globally, emissions from land use, land use change and forestry (LULUCF) are huge. In the past 20 years, it has been estimated that the emissions from LULUCF have reached 1.65 Gt Carbon per year. More than 80% of this has been from developing countries, especially those which have large areas of tropical forest such as Brazil, Indonesia, Malaysia, Papua New Guinea, Gabon, Costa Rica, Cameroon, Republic of Congo and Democratic Republic of Congo. According to the 2007 IPCC Report, forest loss has reached an alarming 13 million hectares per year, while a further 7.3 million hectares per year suffer various degrees of degradation.

Deforestation and forest degradation are the largest sources of greenhouse gases in the developing countries . While developed countries grapple with the challenge of reducing their high emissions through new technologies and clean development, tropical countries might also contribute substantially to the global challenge by asking whether economic development pathways can be found that are less dependent on the conversion of forests than has been the case through history.

Though governments are well aware of the consequences of their shrinking forests on the global climate, the reality of how to change economic development pathways requires the cooperation and positive assistance of all countries. Rising world demand for tropical timber; large numbers of rural poor forced to seek their livelihoods on the forest frontier; agribusiness in search of additional lands for commercial crops or for cattle ranching, all create pressures resulting in tropical deforestation and forest degradation.

Not only must the drivers of deforestation be removed but new international markets and new protocols are also necessary. As is the case with many other environmental services of forests, such as biodiversity or the regulated production of clean water, the lack of a tangible financial market for the reduction of forest-related emissions of GHG gases has meant that tropical countries are not compensated for reducing deforestation and forest degradation. As there are presently no regulated financial markets for valuing and trading the carbon retained in forest ecosystems, conventional forest products or alternative land uses remain potent incentives for deforestation.

1.2 The International REDD Initiative

With the Kyoto Protocol concluding in 2012 the international community is considering the form of potential successors that will reflect experience and new understanding of the dynamics of climate change. One new mechanism based on stored carbon in forest ecosystems was proposed at the UNFCCC COP 11 in Montreal in 2005 to supplement the Clean Development Mechanism (CDM) of the Kyoto Protocol. It was termed *Reducing Emissions from Deforestation* (RED). Indonesia has suggested that this mechanism be expanded to also encompass emissions resulting from forest degradation (REDD).

Carbon credits associated with REDD are fundamentally different from A/R CDM[1], as they derive not from growing new trees but from *avoiding deforestation* and reducing the size of the carbon stock lost as the biomass of forest ecosystems is degraded.

The REDD system will achieve much higher investment rates than A/R CDM projects because of the fundamental differences in the way carbon levels in the atmosphere are reduced. A/R CDM projects sequester carbon from the atmosphere and deliver temporary carbon credits. This means that after the validity of carbon credits expire, buyers must find new carbon credits to replace it with either permanent credit from CDM energy project or other temporary credit. Thus, they are less attractive than credits from other CDM projects which permanently avoid emissions occurring in the first place (e.g. through installing renewable or energy efficiency technologies). REDD projects avoid emissions of carbon into the atmosphere by conserving existing carbon stocks and can therefore be regarded in a similar way to CDM energy projects, which deliver permanent emissions reductions.

The carbon credits generated under a REDD scheme are a consequence of how well new approaches to forest and forest land management succeed in diminishing unnecessary or unplanned carbon loss in comparison to a defined baseline. REDD is a means of providing countries, with significant forest resources, with the financial incentives to retain their forests, by using stored carbon as the natural resource supporting economic development.

REDD is not directed at stopping the use of forests for timber, nor of stopping planned conversion of forests to other economic uses. REDD simply provides a market value for stored carbon which thus becomes another of the natural resources and services which forests offer. REDD credits are produced as a result of savings in carbon emissions against a defined baseline. The baseline represents past rates of loss or projected rates of loss, consistent with national strategic development directions. REDD represents a way to newly value the natural resource of carbon so that it can be considered along with other conventional forest resources, when land use and forest use decisions are made.

The carbon units that may be traded under REDD are those contained in the forest at any one time. The quality of the tradable carbon resource is high when a country can guarantee that the total carbon store at any time will not fall below a predefined amount which is estimated annually as a figure above a published baseline. REDD is therefore dynamic – as a forest is dynamic - growing, maturing, dying and being replaced in a sustainable natural cycle, maintaining a net carbon pool over time. The annual proportion of carbon retained in the ecosystem through reducing the rate of deforestation and degradation over historic rates is the potential financial return to a country from its forest carbon resource.

[1] Afforestation/Re-afforestation Clean Development Mechanism

Frameworks exist for accounting and reporting greenhouse gas emissions for the LULUCF sector (Table 1). LULUCF is the only reporting sector where the reporting requirements for the UNFCCC and the Kyoto Protocol are not the same, having different coverage, and reporting guidelines. For the national inventories, policy frameworks and reporting guidelines can be drawn from the Marrakech Accords; 1996 IPCC (revised) Guidelines and their 2003 Good Practice Guidance for LULUCF (GPG-LULUCF). The IPCC has also adopted a more recent set of estimation guidelines that integrate Agriculture and LULUCF to form the Agriculture, Land Use and Forestry (AFOLU) component of the 2006 IPCC Guidelines.

Table 1. Existing frameworks for the Land Use, Land Use Change and Forestry sector.

Land Use, Land Use Change and Forestry		
UNFCCC (2003GPG and 2006 AFOLU)	Kyoto National	Kyoto Flexibility (trade)
Six land use classes and conversion between them: ▪ Forest lands ▪ Grassland ▪ Crop land ▪ Settlement ▪ Wetland ▪ Other	Article 3.3 ▪ A & R Article 3.4 ▪ Cropland management ▪ Grazing land management ▪ Forest management	CDM ▪ Proposed RED ▪ Degradation yet to be defined but could be contained within forest management
Deforestation = forest converted to another land category	Controlled by the Rules and Modalities (including Definitions) of the Marrakesh Accords	

Decisions regarding the framework for REDD remain to be made but it is likely to be based on existing UNFCCC and Kyoto Protocol frameworks.

A Coalition of 18 Rain Forest Countries has agreed to collaborate in developing criteria for designing and testing forest land use strategy options that will effectively address the underlying causes of deforestation. Indonesia, with the third largest coverage of tropical forests volunteered to host the UNFCCC 13th Convention of the Parties (COP 13) in Bali in December 2007 and accepted responsibility to bring to the discussions of REDD substantial technical analyses of what would be required to implement the REDD concept in a post-Kyoto international protocol.

1.3 REDD in Indonesia and the IFCA Process

As deforestation and forest degradation result in CO2 emissions, Indonesia has the potential to significantly benefit from REDD. Estimates vary widely because of the uncertainty surrounding the possible levels of reduced deforestation that can actually be achieved and the values that could be attached to carbon emissions; but even conservative figures are sizeable. By halving the annual rates of forest loss which occurred in Indonesia between 2000

and 2005 (see Table 4 and 6), the estimated value of carbon credits is between $ 2.5 and $4.5 billion per year[2]. These amounts are considerable compared to the annual state budget for the MoFr[3]. They represent a significant economic incentive to design better and more sustainable approaches to the use of forest resources.

In the Indonesian context, REDD payments for verified reductions in past rates of deforestation could facilitate GOI proposals for a doubling in size of the pulp and paper industry from 6 million to 12 million tonnes; to more than double exports of palm oil from the current $ 3.75 billion to something in the order of $ 7 billion a year; and to sustain an expanded timber industry which currently generates about $4 billion a year.

The investment cost of a broadly based integrated forest, agriculture, rural development and forest industry sector program, designed to create a sustainable forest management regime which maximizes Indonesia's tradable forest carbon resources is estimated at in excess of $10 billion between 2008 and 2012. REDD-related financial resources could make a very significant contribution to meeting the costs to be faced by provincial and district government administrations, and by the pulp paper, oil palm and timber industries, during the transition period before adequate additional plantation and oil palm resources come on stream. REDD-related incomes could also support a substantial investment in peat land restoration and broadly-based, rural and village level forest enterprises. Such an investment could result in alternative and sustainable livelihoods for many of Indonesia's 10 million lowest income families who currently survive on uncontrolled harvesting of forest and expansion of slash and burn agriculture.

In preparation for the COP13, Indonesia formed the *Indonesian Forest Climate Alliance* in July 2007. Through IFCA process, a group of experts analyze how a REDD scheme could operate as a practical carbon emission reduction mechanism. The IFCA is The IFCA is a forum/umbrella for communication/coordination/consultation of stakeholder working on forest and climate changes in Indonesia. The IFCA is coordinated by the Ministry of Forestry, consisted of government, private sectors, civil societies, scientific institutions and interntional partnerss. The IFCA process in 2007 was supported by governments from Australia, Germany and the United Kingdom under the coordination of the World Bank. Universities and International Research Organizations from inside and outside Indonesia have also contributed their expertise. These include CIFOR and ICRAF, The Australian Greenhouse Office, the Australian National University, Winrock International, the World Resources Institute, URS, Ecosecurities, The Nature Conservancy, WWF, Sekala and Wetlands International.

Under the direction of the MoFr, Forestry Research and Development Agency (FORDA) nine IFCA working groups were brought together to produce technical working papers between August and December 2007. A total of 60 national and international experts in all aspects of forestry and climate change have participated in the preparation of technical papers which address the elements of the *supply chain* necessary to produce carbon credits from REDD project activities.

By the time of COP 13 in December 2007 each of the working groups had developed their technical papers to a comprehensive 2nd draft stage: a process which has involved extensive research by the specialist teams and a structured program of consultations with principal

[2] Current price on REDD voluntary market is between 10 and 18 US$ per tonne CO_2

[3] MOF annual budget is about $ 470 million.

stakeholders from the Ministry of Forestry, national and international NGO's and forest industry groups.

The IFCA process has involved two, one week long writing workshops involving all the specialists: the first between the 20-24th August; and the second between the 29th October and 2nd November. These periods have allowed for not only the development of ideas and the sharing of information within the working groups themselves; but also the opportunity for cross-fertilization of ideas between the groups, improving consistency in both data and approaches. During both periods in August and in October, the writing workshops have culminated in focus group meetings with counterparts from the Ministry of Forestry and ***national workshops*** where ideas developed in the working groups have been tried out and enhanced by input from the broad audience of stakeholders interested in the future of a REDD scheme in Indonesia.

The first of these major outreach workshops was the *National Workshop on Forestry and Climate Change* convened by the German Government on 27-28 August 2007. This workshop provided the opportunity for the Indonesian Government to launch the IFCA process and to outline its intention to take leadership in the issue of REDD at the UNFCCC negotiations for COP 13. The Workshop provided a series of background papers and an opportunity for small group and plenary discussion for over a 100 participants including representatives from the parliament, 8 ministries, 15 forestry agency representatives from key provincial and local governments, 15 national and international NGO's, 9 Universities, 5 international organizations including the UNFCCC, and 15 multilateral and bilateral donors.

The second National Workshop on REDD and Climate Change was convened by the IFCA on the 5-6 November. This Workshop focused on a review of the materials and analysis that the international IFCA expert teams had put together in the four months from July. The national workshop provided the opportunity for the IFCA to gauge the responses of a broad cross section of stakeholders representing over 270 organizations involved in forestry, climate change, community development and human rights. The group of some 300 participants included 150 representatives of national, provincial and local government agencies from across the key forestry provinces; 11 universities 58 international and national NGO's 11 embassies and 24 international donor or expert organizations. It also included representatives of 14 of the largest private companies and forest industry groups who will play a key role in implementing the changes necessary for the forest sector to maximize the effectiveness of a REDD carbon trade.

IFCA outputs were integral parts of the material presented for discussion by the Ministry of Forestry at a parallel event at UNFCCC COP13 on the 6-7 December 2007 to officially launch Indonesia's REDD roadmap where Indonesia was able to:

- Demonstrate its firm intent and readiness to advance the REDD initiative;
- Discuss the findings of studies conducted by the IFCA; and
- Share perspectives and experiences with international partners on promoting and developing REDD related activities in the forestry sector

The event was opened by the Minister of Forestry with an opening speech from the Minister of State for Environment and presentations affirming their commitment to REDD by the Governor's of Papua and Aceh.

The event was attended by more than 400 participants from local and international governments, the private sector, civil society, donors and academia. It featured a number of presentations on the role of community forestry, conservation, ecosystem restoration, and fire management in efforts to implement REDD. There was also discussion concerning issues of governance through

enhanced forest monitoring and law enforcement. Discussions like this emphasized the importance of the IFCA process in view of the skepticism with which the concept of REDD is held by NGO's interested in the rights of access and land tenure over Indonesian forests; and also among industry groups who are concerned by the extent to which a REDD mechanism may interfere with their access to land and forest resources.

Prior to COP 13, in October, the IFCA launched its website to further enhance its outreach nationally and internationally and to build a venue for a developing database and exchange of information and ideas. The site provides for an online public clearinghouse for the most up-to-date information, and a collaborative *Wiki* for IFCA members.

Following revision of the website after the UNFCCC COP 13 in Bali in December 2007, the website now offers a complete overview of REDD materials from the Bali meeting and is the most comprehensive source of such information available online.

Several hundred users had used IFCA online resources by the end of December, and a second round of online promotion is expected to expand the number significantly. The site links - and will ultimately complement - the Government of Indonesia website on REDD.

In 2008 the IFCA process has continued with further review of the draft documents and the opportunity to complete a more detailed analysis of historic patterns of deforestation. Further consultations have occurred with the Ministry of Forestry and other stakeholders. The feedback from these sessions has allowed a clearer exposition of this synthesis Consolidation Report which now focuses more clearly on development and implementation of the REDD process in demonstration projects prior to 2012.

The key lesson learnt from the process is the importance of treating REDD as an integrated product where all links in the supply chain need to be in place for effective implementation.

1.4 The REDD Supply Chain

The production of a REDD carbon credit requires the implementation of a series of steps for which new institutions and practices will be required. These will operate at the national level but also at sub-national levels of government and at the level of the project. Determining the architecture for these steps is a challenge for the international community and for Indonesia as it moves towards the formulation of a compliance mechanism for REDD after 2012. However, the architecture of the individual steps evolve, it is fundamental that each step will need to be addressed and the progression of steps seen as a system if tradable credits are to emerge. This system is referred to as a REDD carbon credit supply chain.

The REDD Supply Chain consists of four principal elements:

2. The development of an organizational/ management infrastructure capable of:
    - setting a baseline against which annual emissions can be measured ;
    - The capacity to monitor the changes with sufficient precision to deliver confidence and quality to the tradable carbon credits;
    - A structure through which the sale of carbon credits could be managed
    - A structure by which income from the trade in carbon credits can be distributed to those agencies or groups responsible for achieving the reductions.

2. The identification of those activities, or organizational and industry changes necessary to achieve a reduction in emissions; and
3. The development of a carbon market system capable of handling the trade, especially recognizing the nature and source of potential buyers.
4. A system of forest governance that ensures that law is enforced; that systematic issues of governance such as transparency is addressed and that car bon transactions are safeguarded.

The inter-relationship among these four factors is illustrated in Figure 1. The production of a carbon asset commences with the activation of the driver: strategies, policies and actions which reduce deforestation below historic (Business as Usual) levels.

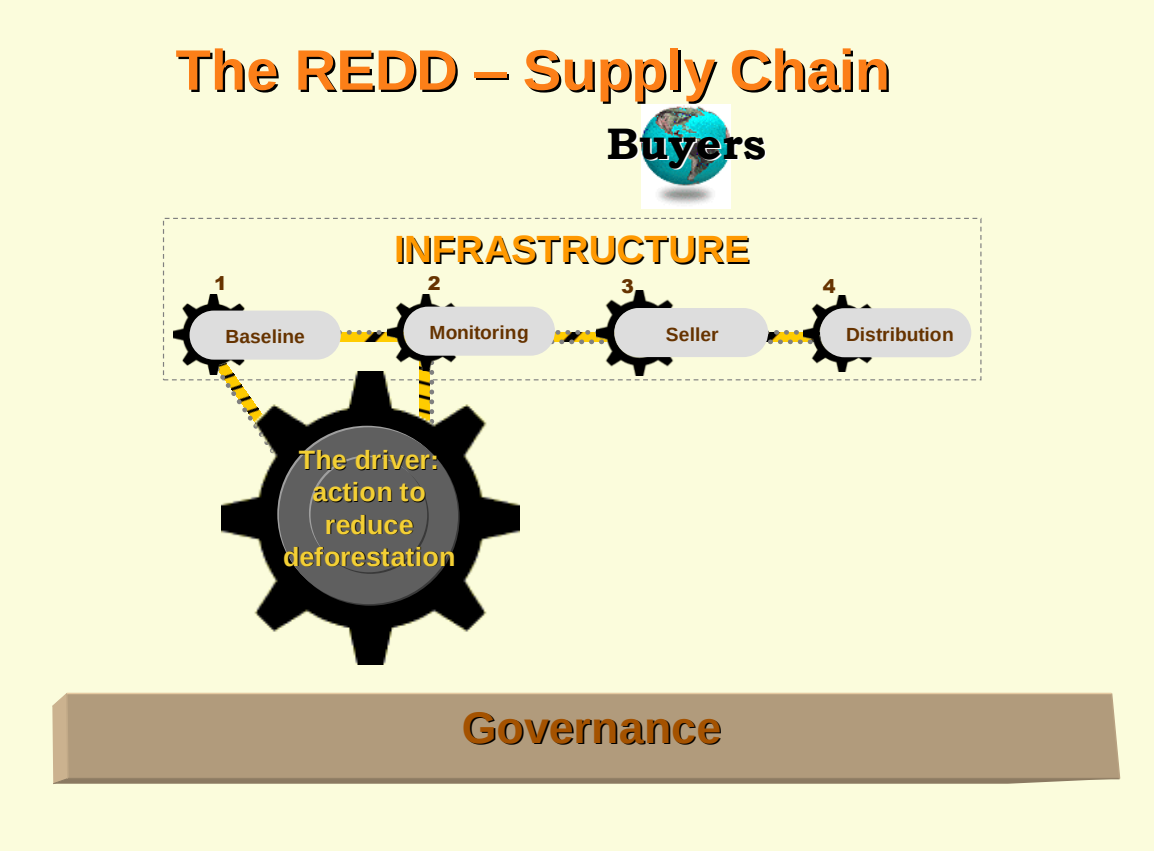


Figure 1. Relationship among the four components which implement the REDD carbon credit supply chain

2. THE SIGNIFICANCE OF REDD FOR INDONESIA

2.1 INTRODUCTION

On the 24th October 2007, in Bogor, at an informal meeting of environment ministers from 40 countries, the President of Indonesia expressed the willingness for Indonesia to reduce its GHG emissions through strategies which included avoided deforestation. He declared, that the cost of doing this should come from the international community and preferably through international carbon exchange markets, as developing countries would require compensation for foregoing the opportunity costs of conventional forest resource uses.

Subsequently, at a meeting of UN Member States in Bangkok, starting 31 March, the President, in a joint statement with the Prime Ministers of Poland and Denmark, declared his intention that Indonesia become an international leader in mitigating climate change[4] and pointed out that the best way forward would be through improved management of the carbon stored in its forests.

'This implies a multifaceted approach engaging not only traditional environment and energy policies, but also a variety of other crucial policy areas. Indonesia acknowledged this fact at the Bali Conference by engaging environment ministers as well as ministers of finance and trade. The agenda is so broad and challenging that engagement at the highest political level is crucial for achieving progress and timely completion of negotiations on a new global agreement'.

This Chapter explains why Indonesia can make such a commitment through improving forest management as a means of reducing its carbon emissions. The chapter begins by explaining the framework by which forest land is managed through the zoning of the land for specific forest functions. It then discusses the information base which the country has compiled on the extent of its forests; the extent of the carbon stored within them, and the methodology adopted to determine the extent of the losses of carbon from forests. This is then followed by an analysis of emissions between 2000 and 2005 which illustrates not just the contribution that LULUCF emissions from Indonesian forests have made to atmospheric Carbon Dioxide globally. Perhaps more importantly it also provides the basis for understanding the extent of the financial resources that could be available to Indonesia if it were to be engaged in a global climate change mitigation effort, based on reducing deforestation and forest degradation.

2.2 The Framework for Forest Land Management in Indonesia

The main references for managing forest resources in Indonesia are the Law No. 41/1999 on Forestry and Law No. 5/1990 on Biodivesity Conservation. These two laws reflect the phylosophy of forest management in Indonesia which accomodate the needs to utilize forest resources optimally as well as to conserve forest resources to assure obtaining multi benefits in a sustainable manner.

2.2.1 The Functional Zones of the Forest Estate

4

Since the 1960's Indonesia has divided its land area into two for administrative purposes: the national forest land, *Hutan Negara* and non foreest land[5]. The forest land, currently of the order of 112 million ha or about 60% of the land surface, has been administered by the Ministry of Forestry as a national resource for the nation, while the balance of the land has been administered for agriculture and settlement by the other line agencies, including the Ministry of Agriculture (and Estate Crops). Technically the National Land Administration Agency (*Badan Pertanahan Nasional*) has responsibility for the tenure of all land, land surveying and the issuing of entitlements Enclaves of rural and forest dwelling people within the state forest have been accommodated in a number of ways, since the 1967 Basic Forest Law. Under Forestry Law (UU) No. 41/1999, adat rights is recognized

Changing demographic circumstances, and increase in population in the outer islands, decentralization of government and a growing economic importance of estate crops, particularly palm oil, have all contributed to increasing pressure on the Ministry of Forestry to convert land for non-forest purposes. In order to do this, forest land is categorized as Convertible Forest (*Hutan Produksi Konversi*) and decisions on the release of land zoned for this forest function are taken by the Minister on the basis of applications from proponents. Once land is released from the Forest Estate it becomes subject to land use decisions which are largely in the hands of local governments (Kabupaten/Kota) and are subject to a regulated process known as spatial planning, whereby land is allocated over a 5-year time frame and within 25 year long term strategic plans to contribute to economic and social development. Forested land (*Hutan Negara*)) - the potential subject of management for the natural resource of carbon – is largely under the control of the Ministry of Forestry ; but forested land outside the national forest land exists and this is within the scope and decision making capacity of the Local Government, the District Head and the local parliament as well as the Minister of Forestry. Decisions over REDD projects can therefore involve national activities and local activities.

, Indonesian Forest Land is divided into three major functional categories: **Production Forest** (*Hutan Produksi*), **Protection Forest** (*Hutan Lindung*) and **Conservation Forest** *(Kawasan Konservasi*). Within each of these categories there are a number of other functional zones which constrain the range of uses to which the forest can be put.

Production Forest is divided into two secondary categories:

1. ***Permanent Production Forest*** for which sustainable forest management is intended to maintain forest ecosystems within the forest estate. Permanent Production Forest is managed as:

   - Natural Production Forest (*Hutan Produksi Alam – HP-A)*
   - Limited Production Forest (*Hutan Produksi Terbatas – HPT*); and
   - Industrial Plantation Forest (*Hutan Tanaman Industri* – industrial forest plantations)

   The utilization of the production forests is undertaken through forest concessions that are granted to private companies, individuals, cooperatives, communities, or state enterprises concerned with the forest sector. Concessions are granted for 20 to 55 years over natural forests and for up to 60 years over HTI.

   Following a review of non-performing natural forest concessions in 1998, the Minister of Forestry at the time cancelled over 200 concessions which reverted to the Ministry of Forestry and have since had little direct management. This land, particularly in Sumatra and Kalimantan is

5

sometimes referred to as *open access* and is the subject of new initiatives from the Ministry to incorporate them into planned plantation developments through the mobilization of local communities and the granting of a range of community concessions, including *Hutan Tanaman Rakyat – HTR.*

The zoning of the production forests takes into account factors such as soil type, elevation and slope and rainfall, while the distinction between HP and HPT relates to the intensity of permitted logging. The decision to establish a plantation forest HTI can be taken where the damage from concession logging of the natural forest is judged to have caused irreparable damage to the natural forest ecosystem. It is generally acknowledged that the future of Forestry production in Indonesia will be increasingly tied to industrial plantation production.

2. ***Convertible Production Forest*** (*Hutan Produksi Konversi – HPK*). This forest zone, unlike the previous three, is not intended to remain in the State Forest but can be converted to other non-forest uses, such as agriculture, estate crops (e.g., coffee, oil palm, rubber) and settlement..

   The decision to release HPK from the forest estate is subject to ministerial approval based on proposals from industry. Once the land is released its new land use may yield products subject to regulation by the local government, who is therefore an interested stakeholder in forest land decisions.

   Reflecting long established land planning practice, the majority of the HPK is found in the lowlands of Indonesia, more suitable for non-forest uses than higher and steeper landscapes which are reserved for HP or HPT..

Protection Forest (*Hutan Lindung*). Protected Forest has been set aside largely for the preservation of essential ecosystem functions, such as watershed protection and protection of beachfronts, riversides and steep upper slopes of mountains where uncontrolled human activities or logging could easily create *critical land* through erosion. Limited human activities are permitted including the taking of rattan and the secondary forest products at non-commercial scales. The management of Protected Forests has been devolved to Local Government (*Kabupatan/kota)*, which have rights to license use of and payments for environmental services.

Conservation Areas (*kawasan konservasi*). These include a range of protected area types specified in Act No.5 of 1990. Their major purpose is the preservation of biodiversity. The types of protected areas are: *National Park*; *Strict Nature Reserves, Wildlife Sanctuaries, Recreational Parks, Grand Forest Parks* and *Hunting Parks.*. Each of these types of protected area is managed directly under the authority of the central government. A further protected area type of grand forest park, termed *TAHURA or Provincial Park,* has been identified in a number of provinces by the Ministry of Forestry, and its management allocated to provincial government.

National Parks form a distinct type of protected area because unlike all other categories they are managed by staff dedicated to the NP, and they have their own budget allocation.

2.2.2 Improving public access to Forest Land.

Over the last three years theMinistry of Forestry has issued regulations that create four new avenues for improved access and rights over forest resources.[6] The characteristics of these approaches are presented in Table 2

Table 2: Administrative mechanisms for improved public access to the forest estate and its resources

Community management approach	Comment
Collaborative Management in Protected Areas (*Peraturan Menteri Kehutanan* No P19/2004)	Protected Area Management, NGOs and donor-funded projects in many Protected Areas in Indonesia have experimented with approaches, such as *community conservation agreements*, participatory boundary marking, and traditional management zones. This regulation is the first to provide a formal framework for multi-stakeholder management. The regulation is important as it gives managers a legal basis to address problems involving local communities in and around protected areas. By limiting collaboration to routine activities such as patrolling, re-forestation and boundary marking, the regulation does not create significant new opportunities for benefit-sharing from joint forest management. Collaborative management requires review to identify money making opportunities for local communities.
Community Forests (Government Regulation 6/2007)	The Forestry Department has a target of 400,000 ha of community forests by 2009 and 2 million ha by 2012. Community forests are still in the early stages of being implemented. Certificates have been given to 6000 households over an area of more than 8000 ha. Revision of the concept of community forest (*Hutan Kemasyarakatan* or HKm) is one of the most important changes introduced by PP6/2007, and the most rapidly developed and implemented. The idea of HKm was first introduced into policy in 1998, but implementation was weak, and the short duration of permitted activity and other obstacles were blamed for making the concept impractical. The revised HKm regulation has addressed many of these concerns. It allows for granting of conditional use rights over designated areas of production forest and protection forest to community-based groups for up to 35 years. The primary policy objective of HKm is poverty alleviation and the restoration of unproductive forest areas[7]. Timber production is not allowed, but non-timber forest products may be collected and tree-based agricultural systems that have already been established are permitted. The focus is on restoring tree-cover, and particular species and management practices are not prescribed (cf. HTR). The new approach is being accepted by communities and within the Forestry Department[8]. It comes closer than any previous scheme to achieving multi-stakeholder agreement on a set of rules to regulate access to resources, partly because community forests are situated in areas that were effectively unmanaged by the Ministry of Forestry and where there was no significant conflict over the land use. The approach has also proved effective in areas of conflict. An example is in Lampung, Sumatra, where ICRAF and local NGOs have

[6] This section draws on the findings of a recent study of forest governance and corruption conducted by the World Bank and the Indonesian Forestry Research and Development Agency.

[7] Noordwijk et al (2007) ibid

[8] Interview with Muayat Ali Muhshi, FKKM Executive secretary, December 2007

	promoted the use of community forest regulations to reach solutions to long-standing disputes over rights to access land and resources.
Community Forest Plantations (Government Regulation 6/2007)	Government Regulation No. 6 of 2007 also provides for Community Forest Plantations (*Hutan Tanaman Rakyat* or HTR). In the HTR community groups are given access to land within degraded portions of the production forest zone for planting trees which they can then sell. The primary policy objective of the program is economic development, job creation, and the need to secure supplies of fiber for the pulp and paper industry. The HTR license can be for up to 100 years, and is given to a group of households, with each household allowed to manage up to 15 Ha. Government guidelines stipulate the species permitted in each location and this may be advantageous in terms of the pulp wood market[9]. The Ministry of Forestry is planning the allocation of 5.4 million ha of for HTR and has identified broad areas where HTR licenses may be granted. Field investigation by ICRAF suggests that large proportions of the land designated for community plantation has already been cultivated by local farmers, highlighting the need for government flexibility in the selection of species and in the design of the plantations. Rigidity may interfere with the commitment of communities to accept the opportunities these initiatives provide and be counterproductive to the ultimate objective of growing more plantation pulp wood.
Customary Forests (Government Regulation 6/2007)	Historically the rights of local communities to manage the land or forest resources where they claim customary ownership (*hak ulayat*), has not been recognized under the Basic Forest Law in 1967. However hak ulayat has received recognition under Forestry Law 41/1999. In most parts of the country customary (*adat*) institutions and controls, already under pressure from various social, economic, and environmental forces have weakened. G.R. 6/2007 goes some way to fill this gap by providing for the designation of Customary Forests (*hutan adat*) as a legally recognized category within the forest zone. It is believed that this will now be developed as a separate PP[10]. However, designation of a customary forest requires prior recognition of the *adat* community that will hold rights to manage it, and this is beyond the Forestry Department's jurisdiction. Recognition of adat communities must be given by local government decree. While the Ministry of Forestry has indicated its support for this in principle, in practice the designation of customary forest may be appropriate and could lead to, or fail to resolve, conflicts with designated forest functions such as watershed protection and biodiversity conservation, which in the Department's view should be maintained regardless of the access rights granted. Management restrictions imposed according to the functional status of forest areas might therefore drastically curtail the scope for community-based management even where the customary rights of communities are recognized. Critics suggest that customary forest may be vulnerable to abuse by *adat* leaders, who are inadequately accountable to constituents in their communities and may use their position to corruptly sell access to outsiders. It is hoped that the further formalization of customary forest in law will provide mechanisms to check these practices. The Ministry of Forestry and the Indigenous People's Alliance (AMAN) have recently announced that they will work together to compile an inventory of customary tenure claims in the forest zone as a basis for implementation of this regulation.

[9] Noordwijk et al (2007) ibid

[10] interview with Muayat Ali Muhshi, FKKM Executive secretary, December 2007

2.2.3 General REDD Definitions

What is *forest, deforestation* and forest *degradation*? Reduction in *forest* emissions is achieved by reducing the rates of *deforestation* and forest *degradation*. Each of these three concepts needs to be understood and defined.

Under the UNFCCC, Forest Land includes all land with woody vegetation consistent with thresholds used to define Forest Land in the national greenhouse gas inventory. It also includes systems with a vegetation structure that does not, but *in situ* could potentially reach, the threshold values used by a country to define the Forest Land category. Under this definition, forest land includes those lands covered with mixed species natural forests to plantations of single species.

The estimation of deforestation is affected by the definitions of 'forest' versus 'non-forest'. Forest definitions are myriad, however, common to most definitions are threshold parameters including minimum area, minimum height and minimum level of crown cover. In the FAO Forest Resource Assessment of 2005[11], a minimum canopy cover of 10%, height of 5m and area of 0.5ha is used. However, the FAO approach of a single worldwide value excludes variability in ecological conditions and differing perceptions of forests.

For the purpose of A/R CDM under the Kyoto Protocol, it was determined through the Marrakech Accords that Parties should select a single value of crown area, tree height and area to define forests within their national boundaries. Selection must be from within the following ranges, with the understanding that young stands that have not yet reached the necessary cover or height are included as forest:

- Forest area: 0.05 to 1 ha (Indonesia decided on 0.25 ha)
- Potential to reach a minimum height at maturity in situ of 2-5 m (Indonesia decided on 5 m).
- Tree crown cover (or equivalent stocking level): 10 to 30 % (Indonesia decided on 30 %).

Under this definition a forest can contain anywhere from 10% to 100% tree cover; when cover falls below the minimum crown cover as designated by a country that land is classified as non-forest. However, if this is only a temporary change, such as for timber harvest with regeneration expected, the land remains classified as forest.

The above definition for forests may or may not be applicable to REDD since negotiation is still on-going .

The UNFCCC Decision 11/CP.7 defines **deforestation** as *the direct, human-induced conversion of forested land to non-forested land.*

Effectively this definition means a reduction in crown cover from above the threshold for forest definition to below this threshold. For example, if a country defines a forest as having a crown cover greater than 30%, then deforestation would not be recorded until the crown cover was reduced below this limit. Yet other countries may define a forest as one with a crown cover of 20% or even 10% and thus deforestation would not be recorded until the crown cover was reduced below these limits. If forest cover decreases below the threshold only temporarily due to say logging, and the forest is expected to re-grow to the crown cover above the threshold, then this decrease is not considered deforestation. However, this situation is unlikely to exist in Indonesia as natural forests are not clear

[11] FAO – Food and Agriculture Organization (2006). (www.fao.org/forestry/fra2005)

felled or intensely logged, as would be needed to decrease forest cover below the Indonesia's threshold of 30%; if forest cover did decrease below the threshold it is likely caused by clearing for another land use.

Deforestation causes a change in land cover and generally a change in land use, although the subsequent land use often is not detectable from remote sensing imagery. Common changes include: conversion of forests to annual cropland, conversion to perennial plants (oil palm, shrubs, short-rotation pulpwood plantations), conversion to slash-and-burn (shifting cultivation) lands, and conversion to urban lands or other human infrastructure.

When human-induced changes occurring in a forest do not reduce canopy cover below the defined threshold of what is forest, **degradation** has occurred.

The IPCC special report on 'Definitions and Methodological Options to Inventory Emissions from Direct Human-Induced Degradation of Forests and Devegetation of Other Vegetation Types' (2003) suggested the following characterization for **degradation**:

A direct, human-induced, long-term loss (persisting for X years or more) or at least Y% of forest carbon stocks [and forest values] since time T and not qualifying as deforestation.

The thresholds for loss in carbon stocks, long term, and minimum area affected need to be specified to operationalize this definition. Degradation would represent a measurable, sustained, human-induced decrease in carbon stocks, with measured tree cover remaining above the minimum required to be considered forest. Conversion of native forests with high carbon stocks to plantations with lower carbon stocks would meet this definition for degradation—a plantation, likely to meet the definition of a forest in any country, is a human-induced, persistent loss in a significant amount of carbon.

Given the lack of a clear definition for degradation makes it difficult to develop a REL that includes all forms of forest degradation. However, some general observations and concepts exist and are presented here to inform the debate. Degradation may present a much broader land cover change than deforestation. In reality, developing a REL for all forms of degradation in a country will be limited by the technical capacity to sense and record the change in canopy cover in remote sensing imagery because small changes will likely not be apparent unless they produce a systematic pattern in the imagery.

Many activities cause degradation of carbon stocks in forests but not all of them can be monitored well with high certainty, and many of them cannot be monitored well using remote sensing data alone. To develop a REL for degradation, it is first necessary that the causes of degradation be identified and the likely impact on the carbon stocks be assessed.

- Conversion to plantations that have considerably lower carbon stocks than the forest they replaced as a cause of forest degradation would be relatively straightforward to detect, their area estimated, and the change in carbon stocks assessed—data on biomass, and thus carbon stocks, of short to medium rotation plantations are generally relatively well known.
- Selective logging (both legal and illegal) is a common form of change in carbon stocks of forests remaining as forests in many developing countries. Tree felling gaps, roads, and log decks can be observed in high-resolution satellite imagery (e.g., Landsat). The reduction in carbon stocks from selective logging can also be estimated without the use of satellite imagery through field measurements or by methods given in the IPCC 2006, AFOLU,

- Degradation of carbon stocks from forest fires (as opposed to crown fires that kill trees) could be more difficult to detect with satellite imagery and little to no data exist on the changes in carbon stocks. Depending on the severity and extent of fires, the impact on the carbon stocks could vary widely. Natural forest fires are rare in humid tropical forests; almost all are human-induced.
- Degradation by over exploitation for fuel wood or other local uses of wood often followed by animal grazing that prevents regeneration, a situation more common in drier forest areas, is likely not to be detectable from satellite image interpretation unless intense degradation results in large changes in the forest canopy.

While definitions of *forest* and *deforestation* are relatively easy to understand and to apply, a practical definition of forest *degradation* still presents problems in terms of how to achieve a quantifiable estimate. For this reason this document places most emphasis on *deforestation*, recognizing that further work will be required to provide a practical protocol for measuring forest *degradation.*

2.2.4 Gross vs. net deforestation and degradation?

Carbon emissions from deforestation and forest degradation may be estimated from either *gross* or *net* changes in carbon stocks. The difference between these two concepts is illustrated in Figure 2, which shows emissions resulting from the replacement of a natural forest with either a crop or a tree plantation.

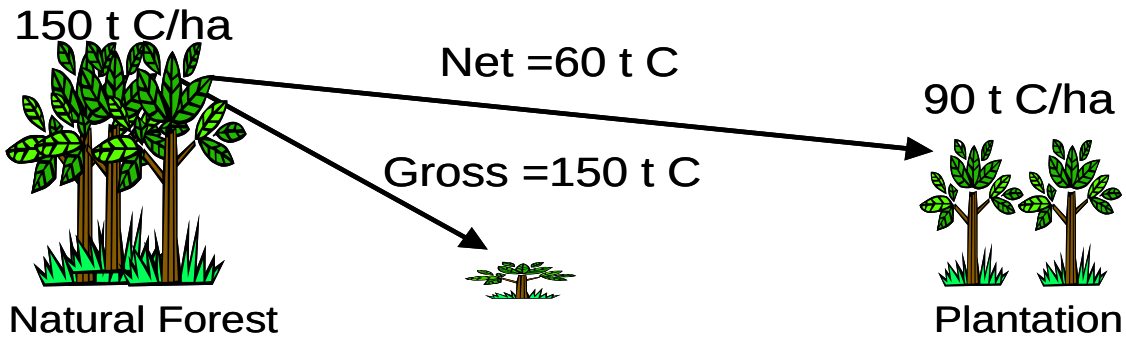


Figure 2. The difference between *gross* and *net* emissions.

Gross emissions assume removal of trees and most of the biomass and that all carbon is emitted. It does not include any reductions for the carbon sequestered in the vegetation of the replacing land use. *Net emissions* assume removal of trees and most of the biomass and that all stored carbon is emitted, but allows for counting the carbon stocks on the area deforested as they are replaced. In Figure 2, if the carbon sequestered in the replacing land use is not considered, the gross emissions are 150 t carbon or 550 t CO2. If the natural vegetation is replaced by plantation forest that sequesters carbon, after say seven years the actual loss of carbon from the site will be that from the natural forest minus that sequestered in the plantation at maturity: 150 t C minus 90 t C for a net of 60 t C.

Where an area of natural forest is removed for the purposes of creating a plantation it may seem attractive to consider applying the concept of *net deforestation* because it is assumed that the level of emissions will be lower because of subsequent carbon sequestration as the plantation grows. Thus after

say seven years the actual loss of carbon from the site will be that from the natural forest minus that sequestered in the plantation at maturity.

The difficulty with this argument is that carbon stock is monitored annually for REDD so that in the year when deforestation occurs *gross* and *net* carbon emissions will count as the same. In subsequent clear-felling of plantation forest blocks *net* and *gross* carbon emissions will also be the same, although lower than in the initial clearing of the natural mature forest. The system thus might create the perception that there is an unfair penalty which cannot be redeemed through subsequent sustainable forest plantation management.

The solution to this dilemma is not to focus on the issue of *net* versus *gross* deforestation but rather to consider the more tangible issue of what the level of planned deforestation will be within the context of national and regional strategic economic development, taking into account the *Net Present Value* (NPV) resulting from evaluation of the stored carbon market resource. The projected changes in forest cover which optimize the total land resources can then be eliminated from a projected baseline.

Gross emissions are higher than net emissions and result in a higher REL. International discussion on REDD has focused on gross deforestation so as not to be confused with land cover changes of afforestation and reforestation covered under the CDM. IPCC Guidelines concerning REDD focus on reducing *gross emissions*. Throughout this report, emissions reported are *gross emissions* from deforestation[12]. Emissions from degradation have not been considered as they did not result in the removal of the tree canopy below the threshold level considered for forest.

2.2.5 What factors influence the development of REDD activities?

There are three key core concepts that need to be understood to develop projects and acceptable methodologies to deliver carbon credits: *permanence*; *leakage*; and *additionality*.

Permanence addresses the extent to which forests permanently store carbon. This issue has been addressed several ways. The *Clean Development Mechanism* (CDM) issues carbon credits for forestry projects of limited duration (temporary or long-term Certified Emission Reductions (tCers/lCERs), which must be replaced after their certified period ends. *Joint Implementation* (JI) and many voluntary instruments do not apply this standard, but address permanence through insurance, or requirements to set aside a buffer amount of permanent credits.

The REDD framework addresses this problem by reducing the rate of emissions from deforestation and degradation rather than preserving carbon in a specific piece of forest. The effect of an avoided deforestation effort would be to reduce or stop the emissions from deforestation, and every year that the effort continues carbon credits are generated by the conservation effort. The ultimate objective is to reduce the rate of emissions from deforestation and degradation, even delaying forest loss in certain areas (without increasing it in others) which has a positive climatic effect and should be valued. REDD activities will likely have to address permanence at the project-level, but they will be embedded in a larger accounting system that guarantees the national emissions rate from deforestation falls below an assigned REL rate.

12 The information used for estimating the REL (given in section 2.2.2) was based on remote sensing data where information on the land cover following tree cover removal was not always available, however, based on the practically perfect match between the area estimated to be deforested between 2000-2005 used in the REL and that obtained from another national source, we assumed that this was a measure of the area of forest converted to non forest. It is possible that some of the deforested area may have actually been degraded only, but the data were not able to discern this.

Leakage: this is an increase in emissions in an area outside the boundary of the REDD activitiy. It is caused either by project activities that essentially *force* deforestation outside the project boundary (activity shifting), or by market effects that change supply and demand. Change in timber supply from REDD activities is particularly prone to leakage caused by market effects. National level accounting for REDD should accommodate leakage within a country. Activity shifts outside the country would be minimized if other countries involved in a linked timber market participate in a regime for reducing deforestation.

If REDD activities are implemented as projects within a country, there is a risk that some projects could cause large leakage emissions that may not be detected until the country does it national accounting. Thus a system for accounting for leakage would need to be in place to prevent rewarding poorly performing projects. Project level leakage can be addressed and limited through techniques developed for CDM and voluntary market projects including comprehensive market analysis for timber and other forest products to identify areas where demand might be displaced, as well as developing alternative livelihoods or sustainable sources of forest products that will not add to deforestation or degradation elsewhere. The remaining risks and uncertainties can also be addressed by discounting the REDD credits eligible for sale under the market.

Additionality. Activities claiming REDD credits must show that reduced deforestation rates attributed to the project would not have occurred in the absence of carbon finance. A number of *additionality tests* exist under the CDM and voluntary standards that can be used to test for additionality under REDD

2.3 HISTORIC DEFORESTATION AND GHG EMISSIONS 2000-2005

2.3.1. Introduction

Past estimates of Indonesia's national greenhouse gas emissions from loss of forest cover are based on land cover change estimates from mapping exercises that were not designed to be used for the purpose of developing a REL for REDD. This resulted in estimates to date with large uncertainty. Global estimates of the national sources and sinks of carbon from land-use change such as the widely-quoted World Resources Institute Climate Analysis Indicators Tools (CAIT) are uncertain on the order of +/- 150% for large fluxes, largely due to uncertainties in the area of forest loss as well as uncertainties in the carbon stocks of tropical forests (see http://cait.wri.org/downloads/DN-LUCF.pdf).

In recent years, however, new information for Indonesia has been produced by the Ministry of Forestry that enable improvements in estimates of emissions levels at the national level. This includes: 1) systematic monitoring of change in forest cover over longer time frame, 2000-05, and 2) updated land cover mapping. Based on this information, and other relevant published data, a first-order calculation of the emissions from loss of forest cover for the years 2000-05 was performed to develop an improved basis for setting a REL for REDD.

The IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry (LULUCF)* provides methods for estimating, measuring, monitoring, and reporting on carbon stock changes and greenhouse gas emissions from LULUCF activities. This first-order calculation for forest cover loss provides estimates for emissions for 2000-05 based on the best available data and a clear method, and contributes to a better understanding of the contribution of different forest cover processes to the emissions. The method further follows the IPCC LULUCF guidance. A central goal of this calculation was to provide more detailed information, thus a higher tier approach, using methods that are

documented, repeatable, reliable, and with reduced uncertainty. The development of the methodology will steer improved data collection for superior, reliable, and credible estimates of emissions in the future.

2.3.2 Methods used to determine historic emissions

Determination of past emission from deforestation required the following analyses: (i) estimation of gross loss in forest cover, including extent, types and location, (ii) estimation of carbon stock in biomass and soil in different forest types/function, and (iii) calculation of CO_2 emission from biomass and soil carbon loss. The following data sets were used for the analysis:

Forest extent. Information on forest extent was derived from the MODIS Vegetation Continuous Fields (VCF) data for 2005, with a tree canopy threshold set to 63% (this closely aligned to the area mapped as forest by the Ministry of Forestry 2003 land use map produced from Landsat ETM+, MoF 2003). The VCF map is a global dataset that maps % tree cover independent of forest definition; VCF data was first produced in 2000 and is regularly updated.

Forest type*:* Peat swamp forests were identified by overlaying the global peat land map produced by Wetlands International (2002) on the VCF-based forest map for Indonesia. Lowland or dryland forest was identified by overlaying the VCF-based forest map with the MoF 2003 land cover map, and forest function classes were identified by overlaying the Penunjukan (agreed forest use categories) 2005 map on the VCF.

Gross deforestation: Gross annual loss of forest cover was derived from MODIS (resolution is 500x500 m) and corrected with Landsat ETM^+ ((resolution 25x25 m) analysis performed by the Indonesia Ministry of Forestry in cooperation with South Dakota State University for 2000-05 (Table 3). This analysis provided both the spatial extent and location of forest cover loss. This was then overlain with the forest type map to classify forest cover loss into meaningful categories for analyzing changes in carbon stocks.

Table 3: Landsat ETM^+ analysis of forest clearing where stratum is the MODIS-indicated high, medium and low sample strata, N is the number of MODIS 20 km blocks per stratus h, n is the number of randomly selected blocks per stratum *h* analyzed using Landsat.

	Stratum	**N_h**	**n_h**
TM Change	0-2	5273	50
	3-9	186	18
	10^+	69	20
	Big	1	1
	Total	**5529**	**89**

Biomass carbon stock. Area-weighted average values were obtained from the carbon stock map of above-and-below ground biomass for Indonesian forests for each forest type/functional class for each island by overlaying the carbon stock map with a map of these forest classes[13]. For areas that were deforested in the remote sensing images, it was assumed that residual carbon stock was zero and the gross carbon dioxide emissions were derived from all above and below ground (ABG) biomass. For missing carbon stock data for a particular forest category in a province, the value from the same land

[13] Based on data from Gibbs and Brown (2007).

use category for a neighboring province in the Island was used. The carbon stocks for 'Non-forest area' and 'landuse unknown' were assumed to be the same. The landuse defined as 'No Data (inland water)' was excluded from the calculations. The variances of AGB area-weighted average carbon for each forest types/function from each province were then pooled using the following formula:

$$S^2{}_{pooled}(i) = \frac{(n_{i1}-1)*s^2{}_{i1} + (n_{i2}-1)*s^2{}_{i2} + ... + (n_{ik}-1)*s^2{}_{ik}}{n_{i1} + n_{i2} + ... + n_{ik} - k}$$

where $S^2_{pooled}(i)$ is pooled variance of above-below ground (ABG) biomass of forest type-*i;* $s^2_{i1,}$ s^2_{i2}, $...s^2_{ik}$ *are* the variance of mean ABG for forest type-*i* in province 1, 2 … and k respectively; $n_{i1,}$ n_{i2} … n_{1k} are number of ABG sample taken from forest type-*i* in province-*1, 2 …* and *k* respectively.

Soil carbon stock. Area-weighted average soil carbon stock to 30cm depth (t C/ha) for each forest class was estimated using a global map of soil C stocks[14] developed by the US Department of Agriculture, Natural Resources Conservation Service. This map is based on a reclassification of the FAO-UNESCO Soil Map of the World combined with a soil climate map, and shows a range in soil C stocks of 40-80 t C/ha. An area-weighted soil carbon stock was estimated based on the map layer of forest type/functional class overlaid on the soil carbon map—it was assumed that this map represented the initial carbon stock in soil, i.e. in 2000.

Emissions from the loss of biomass due to deforestation. Emissions from the loss of biomass due to deforestation was estimated by multiplying the gross annual loss of forest cover in each forest type/function with the biomass carbon stock in each forest type/function**.** Monte Carlo simulation was applied to produce a distribution of emission estimates from the deforestation. For this analysis, standard error of the gross annual forest loss is assumed to be the same as the residual standard error of equation that relate MODIS estimates and LANDSAT estimates while the variances of ABG area-weighted average biomass of all provinces for each forest types were assumed to be the same as the pooled variance.

Emissions from soil from deforestation in dryland forest. The IPCC equation was used to estimate the emissions as the difference in the carbon stock between the initial year and final year, or in this case between 2000 and 2005. The carbon stock at the beginning of the period (2000) was assumed to be that obtained from the soil carbon stock described above. According to the default IPCC methodology, the loss in soil carbon after deforestation is assumed to take place over a 20 year period. The difference between the beginning C stock and the stock at the end of 20 year was divided by 20 to convert it to an annual emissions of CO_2 per ha converted to annual crops. About one-third of the loss in forest area was assumed to be converted to annual cropland (most deforestation in Indonesia goes to perennial crops which have little impact on soil carbon). The annual change in soil C estimated by the IPCC methodology was multiplied by three to represent the roughly the midpoint of the 2000-2005 period of analysis.

Emissions from soil from deforestation of peat swamp forest. This dataset was developed from data from Delft Hydraulics on carbon emissions from peat swamp drainage presented in Hooijer et al. (2006). It was assumed that forest cover removal of peat swamp forests was accompanied by drainage. Emissions from drainage are based on the equation Y = X*0.91, where Y = annual soil CO_2 emissions (t CO_2/ha.yr); X= common drainage depth of 80 cm when peat swamp forests are converted to other land uses, resulting in an estimated annual emission of 73t CO_2 per ha when swamp forests are converted and drained. Once converted and drained, the peat continues to emit CO_2. For the analysis

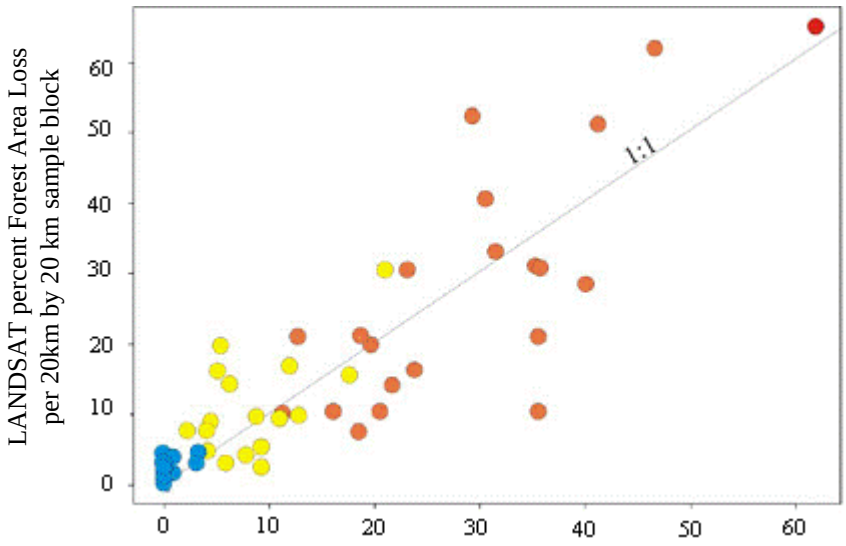
[14] ftp://www.daac.ornl.gov/data/global_soil/IsricWiseGrids/

presented here, this was set to 3 years as the approximate mid-point of the 2000-2005 period of analysis.

Emission from fires in peat swamp forests. The estimates of emissions from fire in peat swamps are based on an estimate of the area of peat swamp that burned during the 2000-2005 interval and an estimate of the emissions of CO_2 per unit area burned. The area burned was estimated from hotspot counts from satellite imagery (ATSR instrument, 1 km resolution, band 3), and an algorithm relating heat intensity to area burned[15]. The fire algorithm has limitations due to cloud presence and atmospheric effects. The emissions for carbon dioxide and methane were calculated using equations from the IPCC AFOLU. The calculations of emissions from peat burning first estimated the mass of peat burned—the product of depth of peat burned and the bulk density of the peat[16]. Emissions factors for CO_2 (0.185 t CO_2/t of burned peat mass) and CH_4 (0.006 t CH_4/ t burned peat mass) were then applied to the estimated quantity of peat burned resulting in estimates of emissions of CO_2-e[17] per ha of peat swamp burned.

2.3.3 Results

Gross Deforestation. The analysis suggests that percent forest area loss estimates from MODIS can be corrected with LANDSAT. The relationship between MODIS estimates and LANDSAT estimates is linear with r^2 of 0.87 and a residual standard error 7.15% (Figure 3). This residual standard error is used as an approximation of the standard deviation of forest area loss.



[15] Muraleedharan et al. (2000)

[16] Peat depth: 40 cm and peat density 0.1 t /m^3 based on data in Page et al. (2002)

[17] Co2-e: the carbon dioxide equivalent (or CO2e) is a measure for describing how much global warming potential a given type and amount of greenhouse gas may cause, using the functionally equivalent amount or concentration of carbon dioxide (CO2) as the reference—for methane this equivalent factor is 23 (that is 1 molecule of CH4 has a 23 times greater warming effect than CO2)

Figure 3. Relationship between percent forest area loss from LANDSAT and MODIS estimates. Red, yellow and cyan are for Stratum 10^{+}, 3-9 and 0-2 respectively.

During the five year period 2000-2005, a total of about 3.5 million ha of forest were deforested in Indonesia (Table 4), or about 1.9% of Indonesia's forest area. Deforestation increased during the 5-year period, from 0.22 million ha in 2000-2001 to 1.18 million ha in 2004-2005[18]. This value is considerably lower than the previously reported estimates of 1.9 million ha per year for 2000-2005 reported in the FAO 2005 report (reported to FAO by the Government of Indonesia)[19]. About 70% of the deforestation occurred in dry land forests and 30% in peat swamp forests. In the dry land forests, the highest rates of loss occurred in production forest and non-forest area (80%), while in peat swamp forest the losses were greatest in production and conversion forests (84%).

Biomass Carbon Stock. The biomass carbon stock of the forests range between 50 and 300 tC/ha for dryland forest and between 75 and 275 tC/ha for peat swamp forest[20]. The lowest estimates are in forests on Java, while the highest occur in Kalimantan and Papua (Figure 4). The resolution of the carbon maps is coarse as the data used to create it were based on regional and national datasets (e.g. climate, inventory data for calibration, and population density data at sub-national scales). This type of country-wide map is a preliminary estimate with relatively high uncertainty. Data from the National Forest Inventory (NFI) might be potential to be used for the improvement of this analysis.

The carbon stock map was overlaid on the map of forest type/functional class to calculate the area-weighted average carbon/biomass. The resulting pattern suggests that on average the carbon stock in peat swamp forest is slightly higher than those in dry land forest (Figure 4 and Table 5). The data fit normal distribution (Figure 5). In the subsequent analysis, these data were used in the calculation of historical emissions by sectors.

[18] Hansen et al. 2008. Forest change in Indonesia 2000-2006. Draft report of a summer workshop.
[19] FAO 2006.

[20] Based on Gibbs and Brown (2007)

Table 4. Gross forest loss by province between 2000 and 2005 (in hectare)

	Dry land Forest							Peatswamp						
Province	Conser-vation	Conver-sion	Landuse unknown	Non-forest area	Produc-tion	Protec-tion	Grand Total	Conser-vation	Conver-sion	Landuse unknown	Non-forest area	Produc-tion	Protec-tion	Grand Tota
Bali	236			1,975	43	21	2,275							
Bangka Belitung	3,735			25,244	12,064		41,043	43			515	429		
Banten	64			5,989	902	21	6,976							
DIY				1,095	64	21	1,181							
Dki Jakarta				129			129							
Jawa Barat	386		21	12,407	4,379	172	17,366							
Jawa Tengah	429		64	8,908	5,796	21	15,219							
Jawa Timur	1,975			17,988	12,386		32,349							
Jawa Total	2,855		86	46,517	23,527	236	73,220							
Kalimantan Barat	6,182	515	43	68,669	26,897		102,306	1,546	2,533	43	14,876	15,391		
Kalimantan Selatan	1,460	8,822	2,726	72,791	43,447		129,246	107	773		3,563			
Kalimantan Tengah	301	67,360		837	280,923	4,143	353,564		39,519		236	57,572	537	
Kalimantan Timur	944		21	105,677	69,786	3,907	180,335	21			1,503	2,147	665	
Kalimantan Total	8,887	76,698	2,791	247,974	421,052	8,050	765,451	1,674	42,824	43	20,178	75,109	1,202	
Maluku	1,245	25,179		4,143	12,150	1,460	44,177							
Maluku Utara	1,481	5,882		3,113	5,109		15,584							
Maluku Total	2,726	31,061		7,255	17,259	1,460	59,761							
Nusa Tenggara Barat	4,894			10,368	6,225	923	22,410							
Nusa Tenggara Timur	5,109	515	43	26,060	3,971	2,297	37,995							
Nusa Total	10,003	515	43	36,428	10,196	3,220	60,405							
Papua Barat	1,846	11,012	43	1,588	10,626	1,224	26,339	902	2,125		193	2,576	43	
Papua Barat Islands	43	623			386	236	1,288		773			43		
Papua Tengah	1,181	2,104		451	3,091	1,288	8,114	236	7,449		301	987	2,683	
Papua Timur	4,765	28,099	279	8,329	52,892	15,412	109,776	3,392	9,187	172	322	56,155	5,044	
Papua Total	7,835	41,837	322	10,368	66,995	18,160	145,517	4,529	19,534	172	816	59,761	7,771	
Gorontalo	623	923	107	17,216	6,075	665	25,609							
Sulawesi Selatan	4,207	3,821	258	71,696	5,130	494	85,606							
Sulawesi Tengah	773	1,245	64	11,677	3,606	1,224	18,589							
Sulawesi Tenggara	3,628	3,241		20,457	17,903	4,508	49,736							

Sulawesi Utara	429	408		6,891	1,996	773	10,497							
Sulawesi Total	9,660	9,638	429	127,937	34,710	7,663	190,037							
Bengkulu	86	21		11,656	987	43	12,794				751			
Daerah Istimewa Aceh	1,825		21	38,445	3,885		44,177	193			5,903			
Jambi	687			44,413	64,763	1,138	111,000	2,018			37,737	29,215	1,825	
Lampung	7,771			61,006	16,872	64	85,713	64			3,778			
Riau	23,054	161,144	43	9,402	263,429	2,769	459,842	31,276	222,450	64	987	326,753	2,318	
Sumatera Barat	987	837		12,965	7,642	1,030	23,462	1,674			11,398	343		
Sumatera Selatan	11,935	18,954	215	128,151	87,752	1,567	248,575	2,490	4,873	21	23,376	52,720	1,631	
Sumatera Utara	2,619	4,572		68,433	69,528	2,232	147,385	1,052	10,304		4,443	30,117		
Sumatra Total	48,964	185,529	279	374,472	514,859	8,844	1,132,947	38,767	237,627	86	88,375	439,149	5,774	
INDONESIA	94,901	345,278	3,950	878,169	1,100,705	47,654	2,470,656	45,014	299,985	301	109,884	574,448	14,747	1

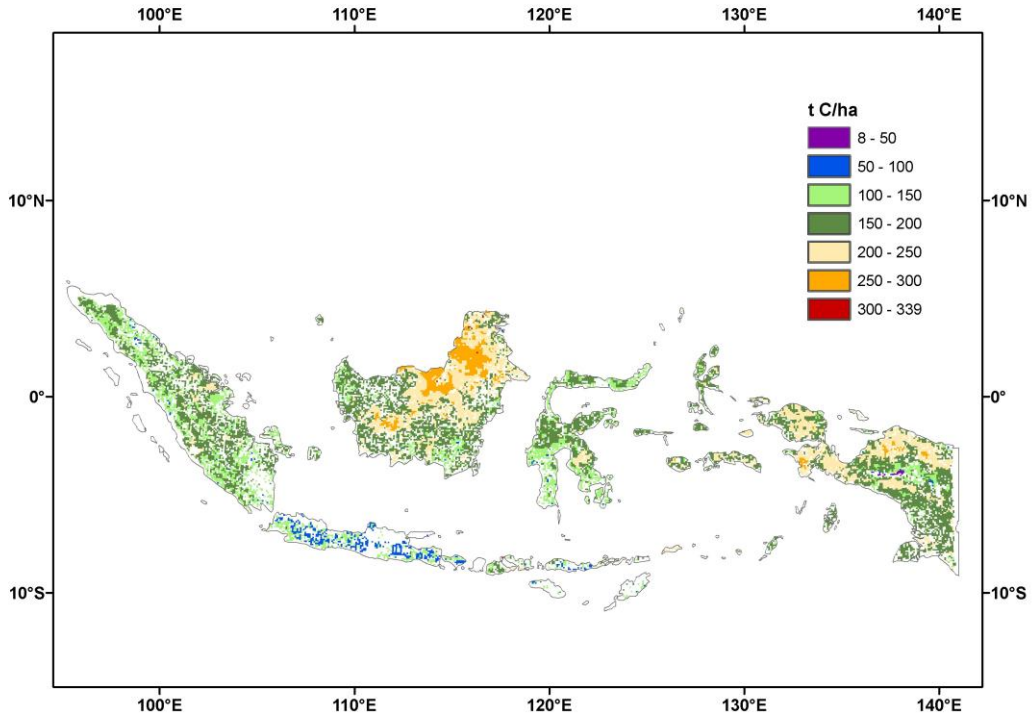


Figure 4. Above and below ground carbon stocks in Indonesia

Table 5. Number of sample (n), mean,and pooled standard deviation of area-weighted average biomass by forest type

	Peat Swamp			Dry land		
NAME LANDUSE	Mean	S_{pooled}	N	Mean	S_{pooled}	n
Conservation	174	30.4	174	183	31.5	1605
Conversion	179	28.4	403	185	32.1	844
Landuse unknown	178	25.5	79	174	24.0	244
Non-forest area	172	25.7	290	161	28.8	1464
Production	181	26.5	504	200	31.9	1792
Protection	181	36.2	171	189	33.7	816

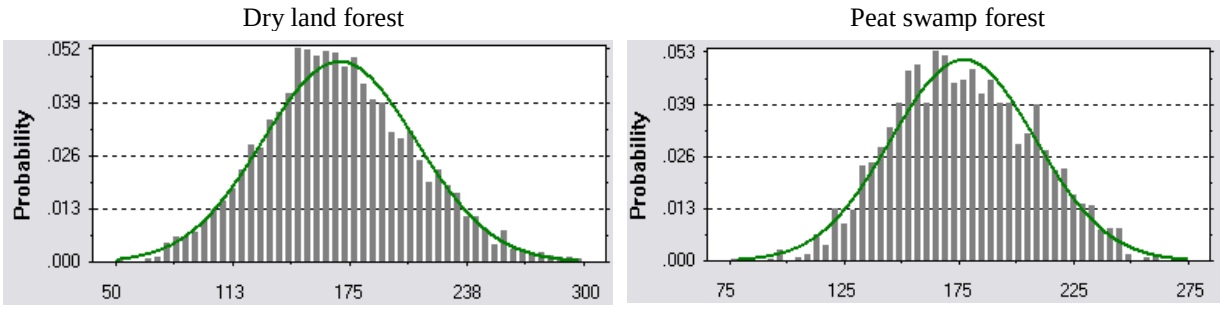


Figure 5: Distribution of above-below ground biomass (tC/ha) for dry land and peat swamp forests.

Gross Emissions from Deforestation. Gross emissions resulting from deforestation of dry land and peat swamp forest in the period of 2000 and 2005 were about 2,479 million tonne (Table 6). An additional emission of about 30 million tonne came from burning peat (Table 7). Thus, a total of 2,509 M t CO_2-e (or 2.5 billion tonne CO_2 equivalent) were emitted during this period resulting in an **annual estimate of 502 million t CO_2-e.**

Considering the rate of emissions by sources, the highest emissions came from the removal of vegetation from dry land and peat swamp forest ecosystems (Figure 6). The average area weighted CO2 emissions per ha (total emissions divided by total area deforested or burned) for vegetation are three times higher than the combined emissions due to draining and burning peat (195 t CO2-e/ha). Emissions per ha from mineral soils is extremely small, due mostly to the fact that most forests are converted to perennial crops, which cause little to no loss in soil carbon.

Table 6. Mean and standard deviation of CO_2 emission from deforestation by province and forest function from 2000-2005 (X 1000 tonne)

	Conservation		Conversion		Landuse unknown		Non-forest area		Production		Protection		Gr
Province	Mean	Stdev*	Mean	Stdev	Mean	Stdev	Mean	Stdev	Mean	Stdev	Mean	Stdev	To
Bali	98	28	0	0	0	0	785	234	17	5	9	3	
Bangka Belitung	2,209	475	0	0	0	0	13,919	3,019	7,149	1,426	0	0	
Banten	31	8	0	0	0	0	2,565	715	405	102	11	3	
DIY	0	0	0	0	0	0	351	131	23	8	7	3	
DKI Jakarta	0	0	0	0	0	0	1	9	0	0	0	0	
Jawa Barat	144	45	0	0	8	3	4,823	1,507	1,730	537	73	21	
Jawa Tengah	172	50	0	0	23	8	3,301	1,056	2,317	747	9	3	
Jawa Timur	841	185	0	0	0	0	6,624	1,641	4,999	1,088	0	0	
Jawa Total	1,189	288	0	0	31	10	17,665	5,058	9,475	2,482	99	29	
Kalimantan Barat	6,217	647	2,584	273	65	6	56,482	6,981	32,645	3,243	0	0	
Kalimantan Selatan	1,045	148	6,138	856	1,719	260	45,324	6,775	28,725	4,513	0	0	
Kalimantan Tengah	255	32	82,548	7,903	0	0	652	86	271,538	29,624	4,015	438	3
Kalimantan Timur	844	102	0	0	17	2	83,948	10,662	60,608	7,367	4,027	426	1
Kalimantan Total	8,361	929	91,270	9,032	1,802	268	186,406	24,504	393,517	44,747	8,042	864	6
Maluku	890	150	17,280	3,015	0	0	2,688	481	8,482	1,448	987	170	
Maluku Utara	962	177	3,634	675	0	0	1,931	351	3,275	589	0	0	
Maluku Total	1,851	327	20,914	3,689	0	0	4,619	832	11,757	2,037	987	170	
Nusa Tenggara Barat	2,968	557	0	0	0	0	6,266	1,198	3,794	696	750	113	
Nusa Tenggara Timur	2,495	585	192	57	20	5	12,007	2,856	1,916	447	830	254	
Nusa Tenggara Total	5,463	1,142	192	57	20	5	18,273	4,054	5,711	1,143	1,580	368	
Papua Barat	2,134	244	10,264	1,350	34	5	1,332	187	10,592	1,278	945	143	
Papua Barat Islands	33	6	1,151	117	0	0	0	0	307	49	177	30	
Papua Tengah	1,053	152	8,057	862	0	0	594	70	3,456	423	3,418	323	
Papua Timur	5,754	726	26,262	3,700	334	39	5,786	1,092	86,820	9,070	14,810	1,993	1
Papua Total	8,975	1,127	45,735	6,028	368	44	7,713	1,349	101,175	10,821	19,350	2,490	1
Gorontalo	353	77	507	115	62	13	8,154	2,031	3,506	756	343	82	
Sulawesi Selatan	2,413	513	2,159	462	139	32	36,484	8,876	2,945	644	305	61	
Sulawesi Tengah	477	99	742	153	41	8	6,635	1,564	2,162	471	726	162	
Sulawesi Tenggara	2,286	483	2,048	439	0	0	11,325	2,619	11,171	2,230	2,321	597	
Sulawesi Utara	223	55	224	54	0	0	3,291	910	1,083	270	432	106	

Sulawesi Total	5,752	1,227	5,680	1,223	242	53	65,889	15,999	20,868	4,372	4,128	1,008	1
Bengkulu	51	11	12	3	0	0	6,584	1,434	586	122	27	5	
Daerah Istimewa Aceh	1,193	226	0	0	13	3	26,313	4,709	2,340	471	0	0	
Jambi	2,061	231	0	0	0	0	55,953	7,094	66,782	8,648	2,112	252	1
Lampung	4,461	729	0	0	0	0	34,622	6,693	9,653	1,927	31	8	
Riau	39,385	4,203	282,607	31,260	87	9	7,201	1,222	479,070	47,933	3,821	434	8
Sumatera Barat	1,886	271	526	109	0	0	15,900	2,378	4,679	952	560	137	
Sumatera Selatan	9,173	1,647	14,950	2,608	132	29	89,395	17,912	97,955	13,638	2,302	312	2
Sumatera Utara	2,329	371	10,787	1,576	0	0	41,612	8,456	61,506	10,033	1,195	296	1
Sumatera Total	60,539	7,688	308,881	35,555	232	41	277,579	49,900	722,570	83,726	10,048	1,444	1,3
Indonesia Total	94,438		472,671		2,694		592,847		1,272,238		44,243		2,4

Note: *The source of uncertainty considered only from forest area loss and ABG biomass stock, while from soils and peat burning are excluded.

Table 7. Total emissions from deforestation in the period 2000-2005 by islands

		Peat burned		
	Forest Loss (000 ha)	CO2 emissions (Mt CO_2-e)	CH4 emissions (Mt CO_2-e)	Total Emission (Mt CO_2-e)
Bali	0	0	0	0
Bangka	0	0	0	0
Jawa	0	0	0	0
Kalimantan	22.661	1.677	1.101	2.778
Maluku	0	0	0	0
Nusa	0	0	0	0
Papua	0	0	0	0
Sulawesi	0	0	0	0
Sumatra	223.341	16.527	10.853	27.380
Total	246.002	18.204	11.954	30.158

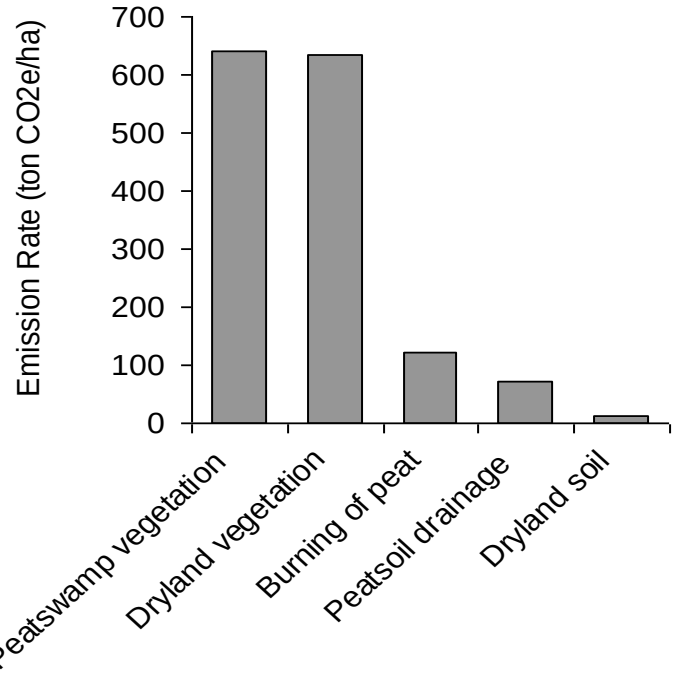


Figure 6. Emissions in tonne CO2-e per ha from different sources

Deforestation and emissions by region/island. Indonesia has different levels of emissions from deforestation within each island. The highest emissions are from Sumatra, accounting for almost 56% of all emissions, with Kalimantan a second with 28% (Figure 7). The combined total for these two islands is 84%, highlighting the importance of focusing on the these islands in implementing reduced emission strategies.

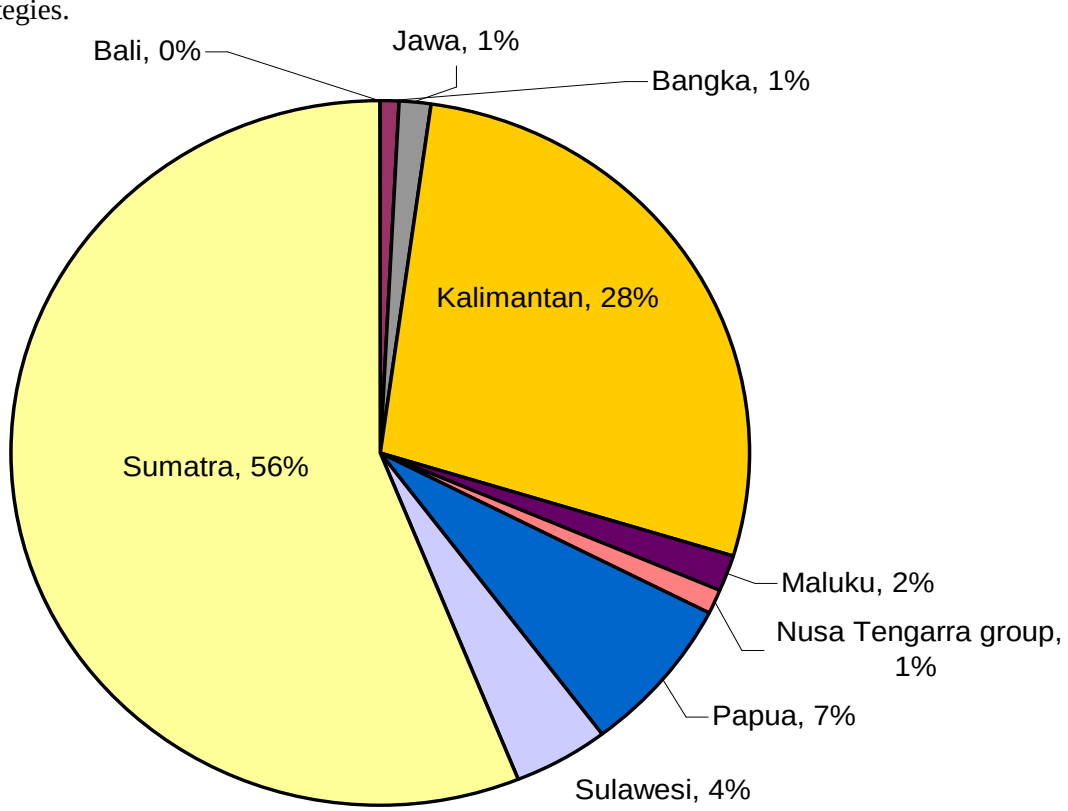


Figure 7. Total CO2-e emissions by region/island from deforestation during the period 2000-2005.

The high emissions from Sumatra and Kalimantan are due to the high rates of deforestation in these two islands—77% of the total (Figure 8), and for Sumatra the important contribution of the existing focus on removal of peatswamp forests.

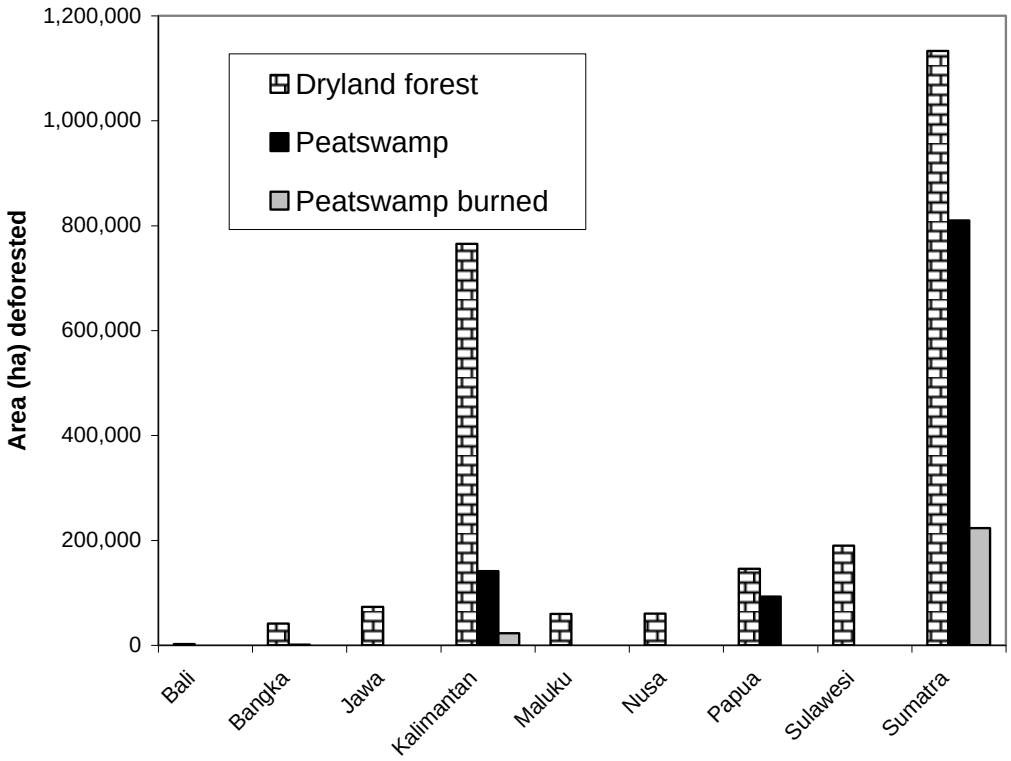


Figure 8. Area of dryland and peat swamp forests deforested during 2000-2005 by Island.

Figure 9 shows that deforestation of dryland forests in Sumatra emits the same order of magnitude of CO_2 as from peat swamp forests when the peat and soil are included. In Kalimantan, emissions from dryland forests are about six times higher than from peat swamp forests.

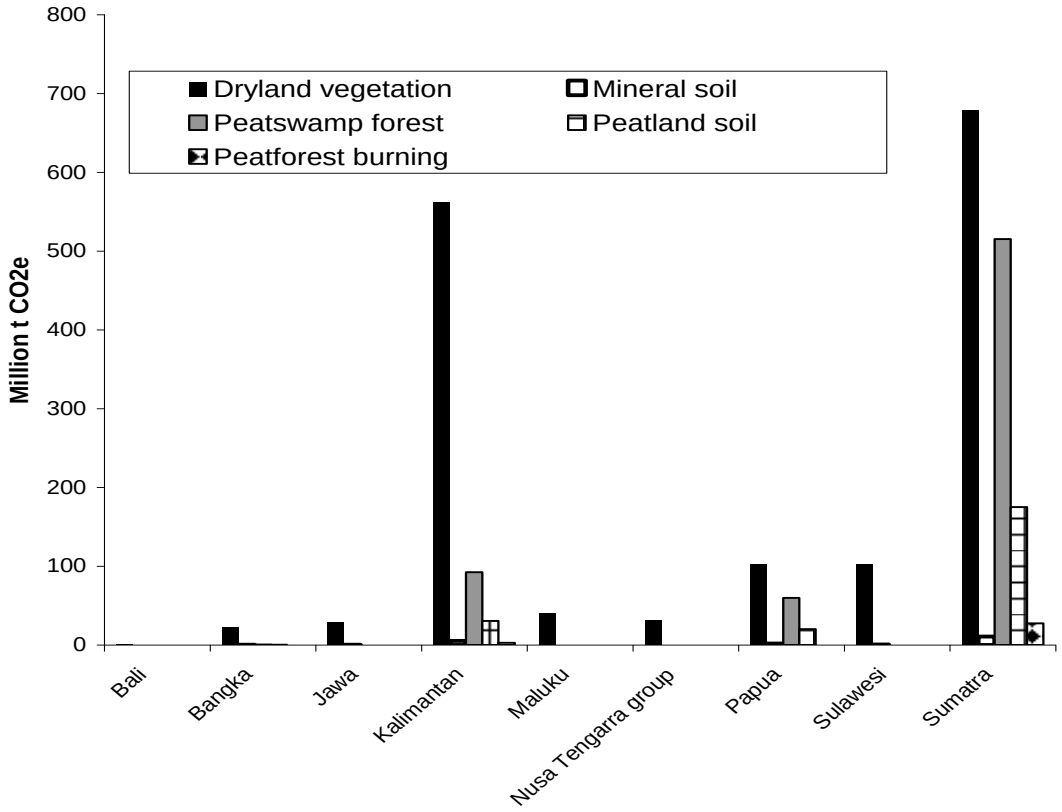


Figure 9. CO_2-e emissions per island by emissions category 2000-2005

Deforestation and emissions from major landscape categories In terms of total CO2 emissions, deforestation of dryland forests in Indonesia are a larger source (62% of total emissions) than peat swamp forests (27% of the total; Figure 10). Draining and burning deforested peat swamp forests accounted for 10% of the total emissions, with practically all the rest due to the clearing of vegetation. Emissions from the soil component of the carbon pool were about 1% of the total for both the dryland mineral soils and for peat. However, the importance of peat as a source of carbon can be appreciated when it is considered that 2.47 million ha of dryland forest were cleared compared to 0.24 million ha of peat forest.

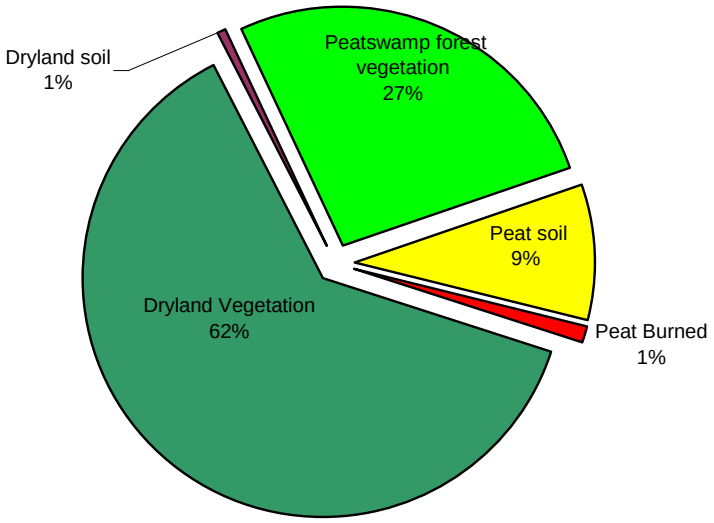


Figure 10. Total CO2-e emissions during 2000-2005 from major landscape categories

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Peat Landscapes in Indonesia. Because of the importance of peat ecosystems as a potential concentrated source of carbon emission it is useful to consider how significant it is for Indonesia to focus on reducing emissions from this source.

The original area of tropical peat, both forested and non-forested, in Indonesia has been estimated at about 20 million ha[21]. From 1987 until 2000, 3 million ha were converted or destroyed leaving an area of about 17 million ha. Nine million ha are in Sumatra and Kalimantan with about eight million remaining in Papua and West Papua. Of the 17 million ha in 2000, an estimated 10.5 million ha was under a forest cover: 3.56 million in Kalimantan, 3.71 in Papua, 3.16 in Sumatra, with small areas on the island of Bangka[22].

Between 2000-2005 a further 1.04 million ha of peat swamp forest was deforested (average annual rate of 209 thousand ha), mostly for oil palm plantation. Almost 78% of the loss of peat swamp forests in this period occurred in Sumatra. Of the area deforested, about 24%, or 246 thousand ha was estimated to have burned as well as drained, maximizing the loss of carbon to the atmosphere. The remaining 75% was drained.

As Figure 10 shows, the total emissions from the destruction of the peat swamp forest is around 27% (940 M t CO2-e) to the total emissions for the period with 72% of this coming from the above ground biomass (Figure 11). .

[21] Silvius et al. 1987

[22] Primary analysis of data for this study.

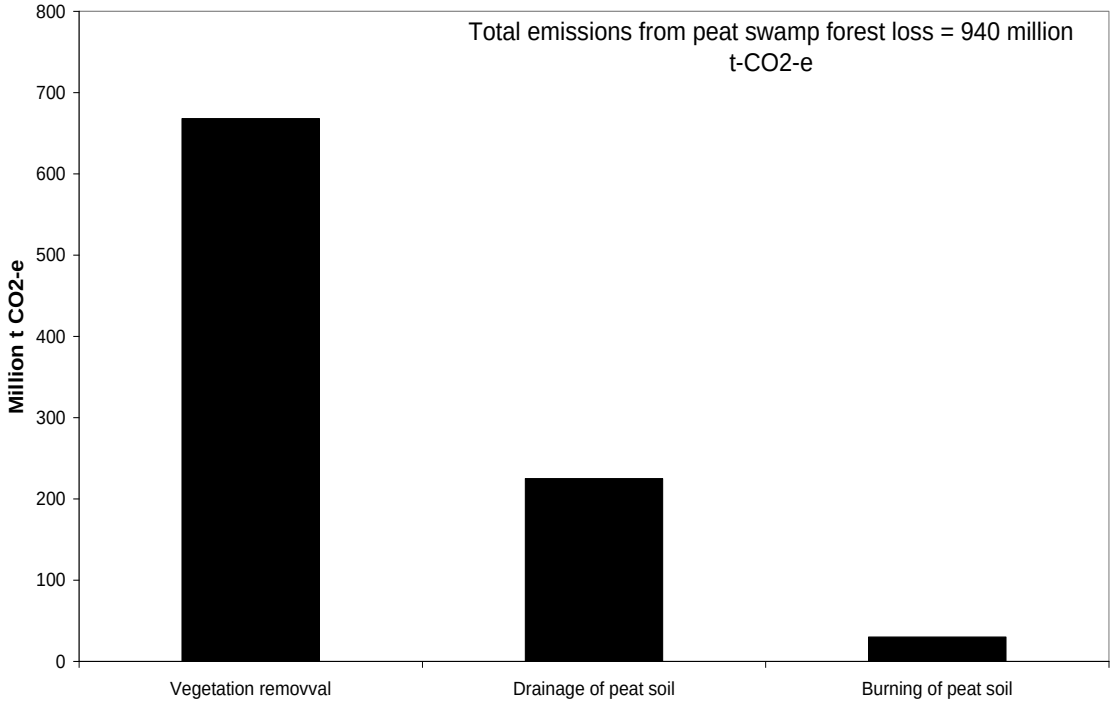


Figure 11. Emissions of CO2-e from of peat swamp deforestation between 2000-2005.

In 1997 Indonesia experienced a particularly severe El Nino event and, as a result, widespread fires occurred throughout the country, particularly on peat swamp areas that had been deforested or degraded followed by drainage. The estimates of CO_2 emissions given in the literature (Table 8) vary widely depending on assumptions about area of peat swamps burned (no real measure of total peat swamp or peat land area burned); the use of broad extrapolations based on studies in small areas, and crude estimates of carbon stocks of peat swamp vegetation and emissions factors for peat burning.

Table 8. Estimates of CO_2 emissions from fires in peat swamps during the 1997 El Nino year.

Study source	Area included and notes	Estimated emissions in million metric tons CO_2
Page et al. 2002	Data from an area in Central Kalimantan extrapolated to all 20 million ha of peat formations (includes with and w/o forest cover)—assumes 1.45 to 6.8 million ha burned	1,762 - 9,432
Levine 1999	Kalimantan and Sumatra—assumes 912 thousand ha of peat lands burned	628
ADB/BAPPENAS 1999	Assumed 1.45 million ha of peat land burned	1,762-2,055

This 2000 to 2005 analysis used the IPCC method and accounting for methane emissions which are also a product of peat burning,. The estimated emissions from burning the 246 thousand ha of peat exposed through deforestation over the whole period are 30.2 million t CO_2 equivalent[23] .

[23] The estimate uses data from Page et al. (2002) to estimate the amount of peat biomass burned based on a density of peat of 0.1 t/m^3 and a conservative burning depth of 40 cm (range of 25 to 85 cm).

When considering REL for peat swamp forests, it is important that the area burned be clearly identified. For deforestation it is clear that the emissions from burning be those associated with the lands being cleared. Fire in peat swamp forests is also an important cause of peat swamp forest degradation and higher resolution imagery, both temporally and spatially, is likely to be needed to better identify areas burning after deforestation and areas burning in peat swamps still meeting definition of a forest (30% or more crown cover).

Deforestation and emissions by forest function class. The proportion of total emissions by forest function class follows that for deforestation, with production forests accounting for the most (73%) and conservation and protection forests the least (8%) (Figure 12).

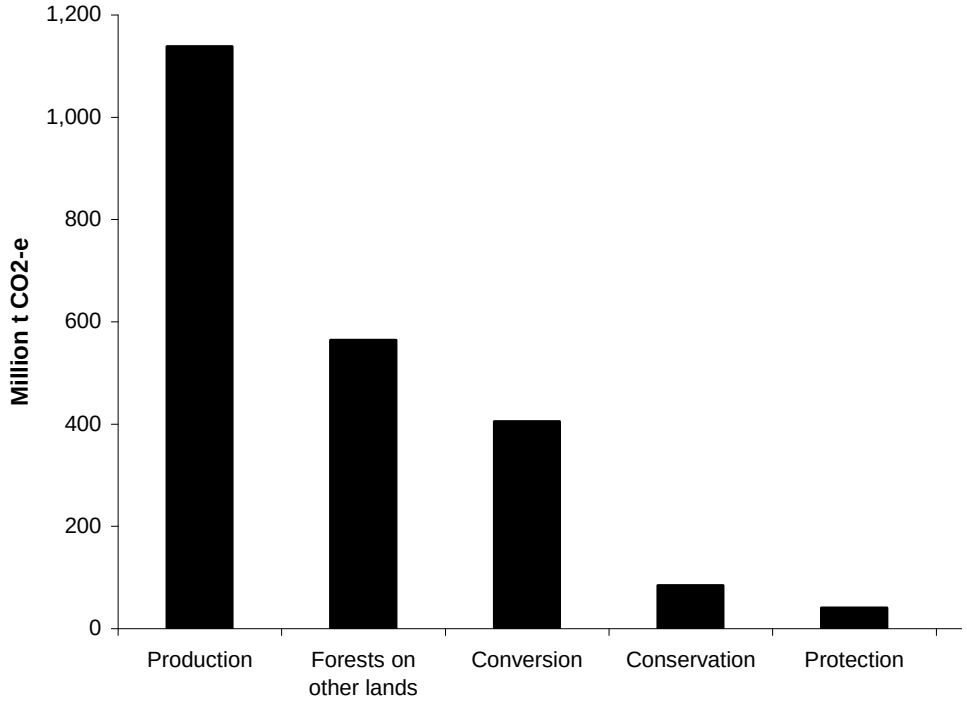


Figure 12. Emissions from deforestation between 2000-2005 by forest function classes.

2.3.4 Discussion: comparison with other studies.

Several studies have been conducted which also provide estimates of CO_2missions from deforestation in Indonesia. The 2006 Stern Report , have used the Climate Analysis Indicator Tool (CAIT)[24] developed by WRI, as their emissions data source.. The data in the CAIT tool are based on deforestation values from FAO Global forest assessment 2000[25] that were combined with carbon stock and flux data from Asia (no data available from individual countries). The deforestation rate for the period 1990-2000 reported in the FAO 2000 assessment is 1.31 million ha/yr, slightly lower than the 1.87 million ha/yr reported in the FAO 2005 report for the period 2000-2005 . The carbon fluxes were allocated according to the deforestation proportion for each country in Asia.

[24] http://cait.wri.org/)

[25] FAO 2001.

The resulting emissions from deforestation in Indonesia based on the CAIT tool were estimated to be 2,563 M t CO_2-e/yr or 83% of total emissions for Indonesia for the 1990-2000 period. In contrast the estimate determined in the analyses undertaken for this study was 502 million t CO_2-e/yr for the period 2000-2005, about 20% of the estimates provided by the CAIT tool.

The main source of difference in the previous estimates and those reported here is in the estimation of carbon stock in the biomass and in the area deforested.

Based on emission estimates and rates of deforestation used in CAIT tools, the rate of CO_2 emission from deforestation is 1956 tonne CO_2 per ha, equivalent to 534 tonne Carbon. More recent empirical data indicates that this value is too high. The average carbon stock for tropical forest in Asia appears to be about 142 t per ha[26]. Based on destructive sampling, the total carbon stock in the virgin forest of Kalimantan is in the range of 200 to 250 tC/ha[27] . These figures alone reduce the estimates by greater than half.

In addition, the estimate of deforestation derived from this study is 0.7 million ha per year compared to the 1.3 and 1.9 million ha per year reported in the two FAO forest assessment reports. Estimates of emissions have also been based on a conservative estimate of the area of peat forest burnt and the depth to which the fires burned.

[26] Gibbs et al. (2007)

[27] Yoneda et al. (1994); Ruhiyat (1995).

3. BUILDING THE INFRASTRUCTURE FOR REDD IN INDONESIA

3.1 INTRODUCTION

This IFCA study suggested a country's *Readiness* to engage in a REDD system, as follows :

1. To set up and operate a Reference Emissions Level(REL) ;
2. To have an independent and credible capacity to measure and monitor the reductions in carbon emissions
3. To have the structure in place to sell carbon credits on international markets; and
4. To have a transparent and equitable structure in place to manage the payments from the trade in such a way as to sustain the reductions in emissions from deforestation and forest degradation.

This chapter is concerned with these four requirements. It is organized to review the conceptual framework and current understanding of each of these requirements; to analyse the status which Indonesia has achieved in relation to implementing each requirement and then to identify what challenges have still to be addressed in achieving readiness in time to be a foundation participant in a post-2012 regime .

3.2 The Reference Emission Level (REL)

3.2.1 Concepts

3.2.1.1 What is a REL?

This is a baseline measure of emissions from deforestation and degradation. It serves as a reference against which reductions in emissions can be measured. It is a function of forest area change combined with the corresponding carbon stocks of the forests being deforested or degraded. No international policy guidance has been agreed as to how a REDD REL should be developed.

The REL can be presented, interpreted and discussed in relation to a benchmark forest cover map, necessary for a national REDD program. This map should show where forests exist and how they are stratified either for carbon or for other national needs.

The production of a benchmark map requires agreement on the year against which all future deforestation and degradation will be measured. 2005 is a logical benchmark year for REDD, as it was in the Montreal COP11 that RED was introduced. International agreement on potential alternative time frames also does not yet exist.

3.2.1.2 How is a REL used?

Figure 13 is a hypothetical example of projections of REL and for emissions from interventions to reduce deforestation/degradation. There are two examples of possible REL (Baseline 1 and Baseline 2) projections for future deforestation and degradation. The lowest line represents the emissions with interventions implemented to reduce deforestation and degradation (REDD intervention). The difference between the REL projections and emissions with REDD interventions represents the potential carbon credits, and thus income stream. The amount of potential carbon credits varies depending on which REL is selected.

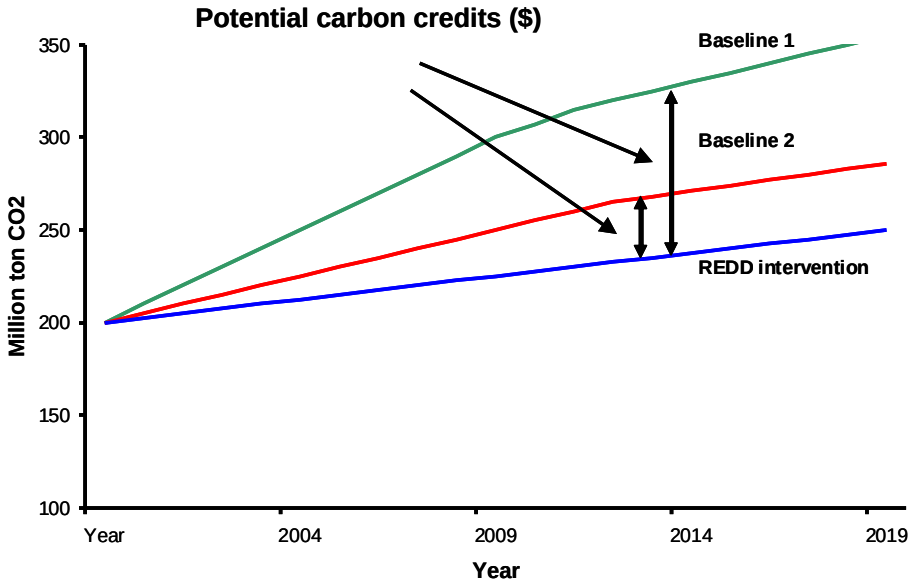


Figure 13. Hypothetical projections of emissions for two REL scenarios and a REDD intervention scenario

3.2.1.3 How is a REL set?

There are basically three approaches to establishing a REL to serve as a performance standard against which future emissions can be monitored:

- An average of past conditions— in which case there needs to be agreement for the time interval covered, when it should commence, and how far into the future it should apply. —this could serve as the REL and would be the simplest approach
- A modelling approach based on unplanned (unsanctioned) activities and planned land use to meet development goals— in which case a model needs to be selected and the future projection period set. This could coincide with the 25-year long-term strategic plans in Indonesia.
- A further option is to consider a mixed REL where emissions from planned and unplanned drivers of deforestation and degradation are considered differently and separately. In this case, emissions from *unplanned* activities are measured against a REL based on historical unplanned emissions, or an average of historical emissions; either of which could be modified according to projected trends in the key drivers of unplanned deforestation. Emissions from *planned* activities would be developed on the basis of national policy defining the area of forest to be converted to other land uses. A *mixed* REL such as this, considering country-specific circumstances including projected development activities, population growth, GDP, and other development trajectories would need to be negotiated among the Parties for a given country.

3.2.2 The situation in Indonesia

There are three potential approaches to developing a REL. Each have implications which need to be evaluated in the Indonesian context. .

The first approach is an **average of past emissions**. This value for Indonesia could, for example, be the average emissions per year from 2000-2005 based on the analysis presented in this report or 501.9 million t CO_2/year and projected forward for a number of years (still to be discussed). If this would be the case for Indonesia, further work on refining and improving the data on forest carbon stocks and deforestation would be needed. Of course a this approach begs the question as to how far into the future should such an emission level be projected? Potential problems with this approach for Indonesia are that the historic drivers and factors responsible for the rates over the period 2000-2005 may not be relevant for the future and the reference period chosen may change the outcome.

The second approach, ***Modeling,*** identifies and interprets the future effects of drivers such as population growth and economic growth on deforestation. Modeling future projections allows particular country circumstances to be identified and considered. A key factor for making such projections depends on whether the drivers of deforestation/degradation are *planned* or *unplanned*. Unplanned deforestation and degradation caused by unsanctioned activities found in native production forests or protected areas lend themselves to an historic spatial analysis. Planned conversions, such as the replacement of native forests with plantation forests; or the allocation of forest areas for non-forest uses such as oil palm estates or settlements, benefit from models that take into account development objectives and economic analysis.

Given that both planned and unplanned deforestation/degradation occurs in Indonesia, it makes sense that the third approach of **mixed modeling** would be highly suited for the country. Moreover, the proportion of planned and unplanned deforestation/degradation is likely to vary by island in Indonesia reflecting local biophysical and socioeconomic conditions. Economic models can be used to project deforestation based on planned development (e.g. conversion to pulp plantations or oil palm plantations), taking into account regional differences within a country as well as global economics of supply and demand. For unplanned deforestation, future projections of where deforestation would likely occur based on past patterns can be made using spatial modeling. For example, tools like GEOMOD (a module in the commercially available GIS software IDRISI) have been used to simulate where, and at what rate, land is converted from forest to non-forest, and to depict the specific location and quantity of the future simulated non-forest category. GEOMOD is used to identify combinations of key proxy drivers of deforestation like distance to infrastructure, population centers, already cleared areas and distance to transportation corridors (roads and rivers). An example of the application of GEOMOD used to simulate the projected risk of unplanned deforestation in East Kalimantan is shown in Figure 14.

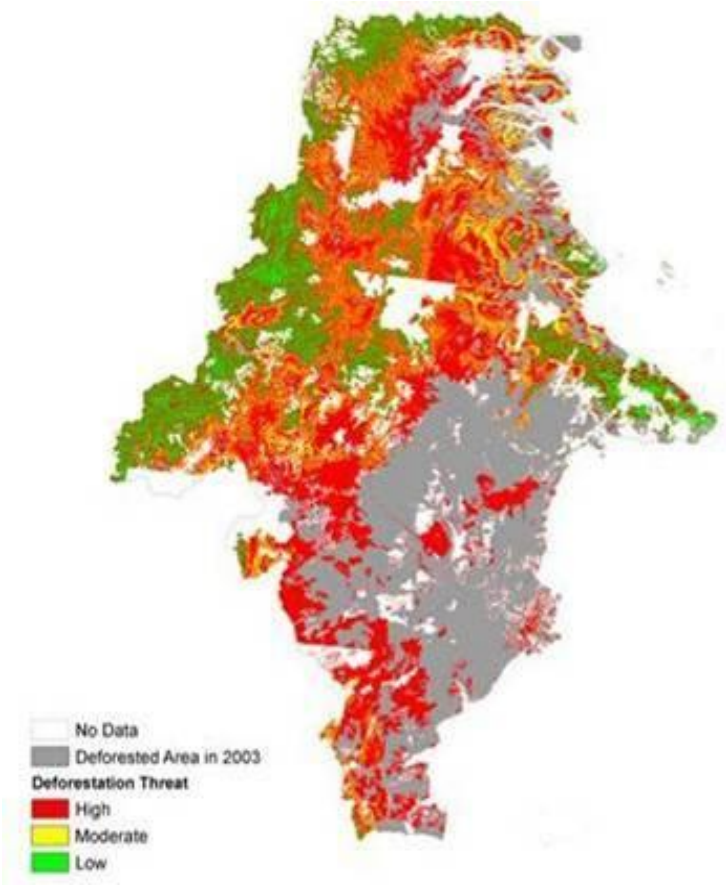


Figure 14. An example of the application of GEOMOD to simulate the risk of unplanned deforestation in East Kalimantan[28].

3.2.3 Challenges to achieving readiness

Given the options available for establishing a REL and given the situation in Indonesia (planned and unplanned that varies across islands), the mixed modeling approach would seem to be the best approach for Indonesia to pursue. However, this will present several challenges to Indonesia to implement. Projection of the pattern and rates of deforestation are likely to be more challenging that the associated estimation of carbon stocks and subsequent estimates of emissions. Estimates of carbon stocks for the REL could be improved with minimal effort and capacity, whereas projecting deforestation rates requires more capacity.

For the planned deforestation where economic models would be used to project deforestation based on planned development, the challenge will which model to select or build to meet the needs and then to develop the database to parameterize it and simulate it different conditions. The accuracy level of the Ministry of Forestry's data on forest function and actual land use and discrepancies between the national and regional levels is a challenge to developing realistic modeling scenarios that will need to

[28] Petrova et al. 2007

be rectified. These scenarios could be greatly improved by addressing deficiencies in this data, creating a more accurate picture of where current and future changes are taking place.

For the unplanned deforestation the challenge will be what approach to use for projecting emissions—based on historic data alone or a combination of past rates and spatial modeling. A projection based on historic data for deforestation alone can use the approach described in this report for estimating the historic emissions. However if spatial modeling was included this would require more resources and capacity.

Regardless of the specific approach taken, forest maps will be required for two time periods (Time 1 and Time 2), whether for recording historic emissions or for developing a modeling approach. In the example given in this report, the Time 1 map was the forest/nonforest map for the year 2000; annual maps for each year 2000-05 were developed with the period ending in 2005 (Time 2). Decisions have yet to be made as to what time periods will be selected for developing RELs. For Indonesia, the best remote sensing data for forests are available for 2000 onward.

The map representing Time 2 could serve as a starting point for developing a benchmark map against which future changes in forest area and corresponding emissions could be measured. However, to produce a level of accuracy likely required for such a benchmark map requires the use of high resolution data in those places where deforestation causes small clearings (not picked up by MODIS) and detailed ground validation of the imagery. A concerted effort must be made to accurately map peat swamp forests so that any changes in them can be well monitored into the future.

Timber production from native forests is an important activity in Indonesia and is also a source of CO2 emissions. Timber harvesting is captured under forest degradation—that is reduction in carbon stocks in forests remaining as forests. Currently, there is no REL for forest degradation in Indonesia. Therefore Indonesia is missing out on opportunities to engage fully in REDD by not having the data and estimates of the historic emissions for this activity. The challenge then for Indonesia is to have the capacity to quantify the emissions from timber harvesting activities.

3.3 Measurements and monitoring

3.3.1 Concepts

3.3.1.1 Why is monitoring required?

Under a REDD mechanism, countries will need to show credible reductions in emissions from deforestation and degradation, measured against the REL at specific intervals in time (e.g. annual or bi-annual). Monitoring will show the success of REDD policies and interventions, which will translate to carbon credits.

3.3.1.2 What is measured and monitored?

Measuring and monitoring activities are needed to quantify the CO_2 emissions from deforestation and degradation that are then compared to the REL—payment for emissions reductions will occur when a country can show that the real reductions have occurred as measured against the REL

Two major types of data are needed to quantify CO_2 emissions from deforestation and degradation:

- Area of forest converted to non forest or area of forest degraded

- Carbon stocks of forests converted to non-forest or degraded

The 2006 IPCC Guidelines for National Greenhouse Gas Inventories for Agriculture, Forestry and Other Land Uses (AFOLU) and the 2003 IPCC Good Practice Guidance for Land Use, Land Use Change and Forestry (GPG-LULUCF) use the term "Categories" to refer to specific sources of emissions/removals of greenhouse gases. The following categories are considered under the AFOLU sector and are commonly equated to deforestation:

- Forest Land Converted to Crop Land
- Forest Land Converted to Grass Land
- Forest Land Converted to Settlements
- Forest Land Converted to Wetlands
- Forest Land Converted to Other Land
- A decrease in carbon stocks of Forest Land Remaining Forest Land is commonly equated to forest degradation.

The IPCC AFOLU refer to two basic inputs with which to calculate greenhouse gas emissions or removals:
Activity data refer to an emission/removal category which is quantified in terms of land area in hectares—these data address the area data
Emission Factors refer to emissions/removals of greenhouse gases per unit activity, e.g. tons carbon dioxide, or equivalent, emitted per hectare of land converted—these factors address the carbon stock data.

3.3.1.3 How are Activity Data derived?

The GPG_LULUCF and AFOLU guidelines define a methodology for assessing the activity data or the change in area of different land categories. The guidelines describe three ***approaches for area change*** (Table 9):

Table 9. A summary of the Approaches that can be used to determine activity data

Approach for activity data: Area change
1. Non-spatial country statistics (e.g. FAO) – generally gives net change in forest area
2. Based on maps, surveys, and other national statistical data
3.Spatially specific data from interpretation of remote sensing data

Approach 1 identifies the total net area change for each land category, but does not provide information on the nature and area of conversions between land uses. As this approach only identifies the net change in forest area, it is unsuitable for monitoring deforestation/degradation as it is unable to distinguish between gross and net changes in land cover.

Approach 2 involves tracking of land conversions between categories. Under Approach 2, the counterbalancing effects of areas of reforestation and deforestation are identifiable.

Approach 3 extends Approach 2 by using spatially explicit land conversion information; thus allowing for an estimation of both *gross* and *net* changes in land categories.

Approach 3 is the only practical approach that can be used for REDD implementation.

3.3.1.4 Emission factors

Emissions factors take into consideration three factors:

- gases,
- pools, and
- Tiers.

Each one of these factors will be discussed in this section.

Gases: Emissions and removals resulting from land conversion are typically determined through the differences in carbon stocks between the initial and final land cover type, reported in metric tons of carbon per hectare (t C/ha) and then converted to metric tons CO_2per hectare using the standard IPCC conversion factor. Deforestation and degradation can also emit non-CO_2 gases from decomposition and biomass burning, which have a higher global warming potential than CO_2. Default methodologies and factors exist to estimate non-CO_2 emissions in the IPCC 2003 GPG-LULUCF and 2006 Guidelines reports. For REDD, which of these gases will be included remains to be negotiated.

Pools: There are five recognized carbon (C) pools in a forest:

- aboveground biomass
- belowground biomass;
- dead wood,
- litter, and
- soil.

A sixth pool: harvested wood products is under discussion. For REDD, which of these pools will be required remains to be negotiated

Tiers: The assessment of the ***Emission Factors*** (changes in carbon stocks) in the various carbon pools of a forest can be obtained at different levels of certainty that are termed Tiers (Table 10).

Table 10. Summary of the IPCC recommended Tiers that can be used for emission factors.

Tier	Data needs/examples of appropriate biomass data
Tier 1 (basic)	Default mean annual increment (for degradation) and/or forest biomass stock (for deforestation) values for broad continental forest types—includes six classes for each continental area to encompass differences in elevation and general climatic zone; default values given for all vegetation-based pools
Tier 2 (intermediate)	Mean annual increment and/or forest biomass values from existing forest inventories and/or ecological studies. Default values provided for all non-tree pools Newly-collected forest biomass data.
Tier 3 (most demanding)	Repeated measurements of trees from permanent plots and/or calibrated process models. Can use default data for other pools stratified by in-country regions and forest type, or estimates from process models.

Tier 1 requires no new data collection to generate estimates of the carbon stocks in forests. And values can be obtained from a variety of table given in the IPCC AFOLU report

Tier 1 data are unlikely to deliver results with sufficient certainty and they also have the potential for bias expressed as over- or under-estimates. Tier 1 estimates thus provide limited resolution of how forest biomass varies sub-nationally and have a large error range (~ +/- 30-70% or more). Tier 1 also uses simplified assumptions to calculate emissions.

Tier 2 is similar to Tier 1 in employing static forest biomass information. It improves on that approach by using country-specific data (i.e. collected within the national boundary), and by resolving forest biomass at finer scales through the delineation of more detailed forest strata.

Tier 2 can modify the Tier 1 assumption that carbon stocks in woody vegetation, litter and deadwood are immediately emitted following deforestation (i.e. that stocks after conversion are zero), and instead develop disturbance matrices that model retention, transfers (e.g. from woody biomass to dead wood/litter) and releases (e.g. through decomposition and burning) among pools. Done well, a Tier 2 approach can yield significant improvements over Tier 1 in reducing uncertainties.

Tier 3 is the most rigorous approach. It uses actual inventories with repeated measures of permanent plots to directly measure changes in forest biomass; and/or a number of process models well-parameterized for country specific conditions. Tier 3 can also modify the assumptions about the fate of carbon stocks in woody vegetation following deforestation and degradation and can model transfers and releases among pools that more accurately reflect how emissions are realized over time.

A country may need to consider all carbon pools and greenhouse gases; information on emission sources, and country specific methods and data for key categories. However the principle of *conservatism* could be applied. In the REDD context, conservatism means that when low uncertainty cannot be achieved, the reported reduction of emissions should be underestimated; or at least the risk of overestimation should be minimized.

Tier 2 is expected to be adequate for commencing engagement with the REDD market but in the long run a complete Tier 3 accounting framework on all GHG emissions can be expected.

3.3.1.5 How are CO_2 emissions estimated

The IPCC AFOLU provides details on how CO_2 emissions can be estimated. There are two fundamentally different, but equally valid, approaches to estimating CO_2 emissions: 1) the stock-difference approach and 2) gain-loss approach. These approaches can be used to estimate stock changes in any carbon pool (application to the soil pool is limited).

The stock-difference approach estimates the difference in carbon stocks in a particular pool at two points in time and could be applied to any Tier level of data. For deforestation where the interest is in gross emissions only, this essentially translates into knowing only the initial carbon stock of the forest. For degradation, the carbon stock at two points in time would need to be known as shown below:

Deforestation—CO_2 emissions/yr = Area deforested/yr x C stock of forest
Degradation—CO_2 emission/yr = Area degraded/yr x (C stock $_{\text{non-degraded forest}}$ – C stock $_{\text{degraded forest}}$)

Estimating the emissions using the gain-loss method is not likely to be useful for deforestation using Tier 1 or Tier 2 data, but could be used with Tier 3. The gain-loss method is most useful to estimate emissions for forest degradation using any Tier level of data. Biomass gains would be accounted for with e.g., rates of tree re-growth after removal of biomass (e.g. removal of timber or fuel wood), and

biomass losses would be accounted for with data on timber harvests, fuel wood removals, and transfers to the dead organic matter pool, such as woody residues from left after timber harvest.

3.3.1.6 What is Uncertainty?

Estimations of carbon emissions from deforestation/ degradation require not only consideration of area change but also carbon stocks. As described in the previous section, the emissions are estimated as a product of area (obtained from remote sensing data) and a carbon stock value (Tier 1-3 method). Each tem has errors associated with it and the IPCC AFOLU describes methods for estimating the total uncertainty in the estimated emissions. Unless both parameters can be estimated with an acceptable level of certainty the least certain measure will affect the overall uncertainty of the assessment. If the estimates of carbon stocks have high uncertainty and the area change data are at low uncertainty, the resulting emissions estimate will still be highly uncertain. This is shown in Table 11.

Table 11. Relationship between uncertainty in remote sensing products for area change and uncertainty of carbon stock estimates[29].

Remote Sensing Uncertainty	Carbon Stock Uncertainty	Total Uncertainty
5%	30%	30%
5%	20%	21%
5%	10%	11%

3.3.2 The Situation in Indonesia

The purpose of this section is to understand how Indonesia is situated with respect to the information required to measure and monitor reductions in emissions against a REL, at an appropriate level of certainty, as interventions would be implemented.

3.3.2.1 Measuring and monitoring area change

Many individual mapping products for Indonesia have been completed (forest maps of 1986, 2000, 2003 from the Ministry of Forestry). Although quite useful, these maps were not designed for use as systematic monitoring products. Recently, however, the Ministry of Forestry has initiated a systematic forest monitoring program using MODIS/TM satellite imagery to assess deforestation from 2000 to 2006. These data are the principal source used in analyzing the loss of forest that has occurred in each of the forest sectors dealt with in this document.

The MODIS/TM data used in this analysis only deals with deforestation not degradation. More detailed remote sensing data sources and methods would be required to detect degradation, potentially including high-resolution satellite imagery, radar data, field measurements and other information.

3.3.2.2 Measuring and monitoring forest carbon stocks

National Forest Inventory. National inventories of forests, if well designed, can provide data from which high-quality estimates of forest carbon stocks can be made[30]. In the mid-1990s, a national

[29] Total error is estimated by the "propagation of errors" method recommended by the IPCC AFOLU.

[30] Brown, S. 1997.

forest inventory (NFI) was carried out in Indonesia[31]. The focus of the inventory was to build capacity within the Ministry of Forestry to undertake ongoing forest inventory activities and to generate forest resource information for policy formulation and planning at national and provincial levels. The inventory established plot clusters on a 20 km x 20 km grid and enumerated trees and estimated timber volumes for trees with diameter (dbh) greater than 20 cm. The report generated stock tables for all forest functional classes and for all provinces. Permanent plots were also established at the time of the inventory. At present, there are about 1197 clusters spread all over Indonesia (Table 12). Provinces in Kalimantan have higher number of cluster than other provinces.

Table 12. Number of forest monitoring clusters by province[32]

Province	**Number of clusters**	**Province**	**Number of clusters**
NAD	30	Kalimantan Tengah	96
Sumatera Utara	33	Kalimantan Timur	222
Riau	90	Kalimantan Selatan	37
Sumatera Barat	45	Sulawesi Utara	21
Jambi	47	Gorontalo	10
Bengkulu	18	Sulawesi Tengah	54
Sumatera Selatan	44	Sulawesi Tenggara	42
Bangka Belitung	0	Sulawesi Barat	0
Lampung	10	Sulawesi Selatan	42
Banten	3	Bali	17
Jawa Barat	6	Nusa Tenggara Barat	33
Jawa Tengah	0	Nusa Tenggara Timur	52
DI Yogyakarta	0	Maluku Utara	0
Jawa Timur	4	Maluku	49
Kalimantan Barat	122	Papua	70

This was a large effort, and if the original field data were available, they could provide a good resource for generating estimates of carbon stocks of different forest types, especially protection/conservation forests—tools and models exist for converting such field inventory data to carbon stock estimates using generic allometric regression equations[33]. Such inventory data could also be used to provide a first order estimate of the impact of logging on carbon stocks as well because the inventory measured plots in both logged and unlogged forests. However, the data were collected in the early to mid-1990s and so are about 10+ years old and for other forest functional classes may be of limited use. Furthermore, to make good estimates, access to the original field data would be needed to better address the biomass in the larger trees and the location of the plots.

Other data sources. Other efforts by a variety of organizations, such as CIFOR, universities or NGO's, are occurring in Indonesia and data on carbon stocks of forests are being collected. Until there is clarity and consistency in the methods used to collect or convert these various data sources to estimates of carbon stocks in forests the usefulness of these efforts will be limited. Good first steps towards improving the current situation would be for the Ministry to establish common protocols for

[31] FAO/Ministry of Forestry, 1996, National Forest Inventory of Indonesia,
[32] BAPLAN. 2008

[33] Chave, J., C. et al. 2005. 9.

its research partners which insisted on including geographic coordinates capable of entry into a GIS data base and the application of IPCC guidance in the AFOLU and GPG reports..

Current efforts by the MoFr to collect field data on carbon content in forests need to make clear the methods and standards being used to ensure it is consistent with international trends. This step could then logically lead to a broader working group among partners to coordinate national multi-stakeholder efforts.

3.3.3 Challenges to achieving readiness

In order to enhance readiness, the Ministry of Forestry should consider reviving the National Forest Inventory (NFI). The NFI would gain from more plots, especially in those forest classes under most threat of being deforested, or those showing highest deforestation rates in 2000-2005 (Production Forests, Convertible Forests and those not under the jurisdiction of the MoFr). These extra data would improve the accuracy and precision of estimates.

There is little to no data on other carbon pools specific to Indonesia. For example, conversion of forest to non-forest results in losses of soil carbon but data for estimating this source of emissions for Indonesia is lacking. Further data are needed to improve the emission factors for draining and burning peat when peat swamp forests are deforested. For example, data on CO_2 emissions from peat swamp forests is needed to determine how emissions vary as a function of the conversion process such as ditching and draining to varying depths. Emissions from fire in peat swamps are based on one study, and clearly more studies are needed on the depth of peat that is consumed in a fire

Forests should be classified into classes that have significance for carbon measurements and can be distinguished from or linked to satellite or aerial imagery. To produce carbon stock estimates that have *low uncertainty*, categories could be based on biophysical factors (e.g. climate or elevation) and human disturbance factors (e.g. previously logged, mature, young secondary). A potential classification of Indonesian Forests, has been analyzed in the IFCA studies to express the variability of forests in these terms. However, this classification has not yet been tested to determine how well it reflects measurable variation in carbon stocks of forests. There are also questions as to whether the categories could be distinguished with available imagery, as the tools and technologies to enable detection of detailed forest classes are still in development. Tools exist that can be used with remote sensing imagery to identify areas being logged but require frequent and high resolution acquisition at least annually for the analysis. Alternatively, the presence of logging associated infrastructure, such as roads and skid trails, can be used to infer the presence of logged forests. Guidance on methods for measuring, monitoring and reporting emissions are presented in a sourcebook of methods and procedures[34].

Indonesia is faced with a large challenge if it is to engage in reducing emissions from forest degradation as no experience exists in monitoring and measuring areas of degraded forests on a regular basis and little data exist on the impacts of harvesting on carbon stocks. The current effort in remote sensing analysis only monitors deforestation—methods exist for monitoring logging[35] for example, but they have not been widely used. Clearly to develop a monitoring system for forest degradation would require training and testing of these methods fin Indonesia and the acquisition of more detailed satellite data and air photos..

[34] Available at the following web site: http://www.gofc-gold.uni-jena.de/redd/
[35] Asner, G.P. et al. 2005; Asner, G.P. et al. 2006.

The NFI did place plots in logged and unlogged forests and these data could provide a starting point for developing a method for estimating emissions from timber harvesting using the stock-difference method of accounting. However, other methods are available that could improve monitoring emissions, for example, CO_2 emissions from timber harvesting are highly related to timber extraction rates and practices, and within Indonesia extraction rates vary. A challenge for Indonesia is to quantify the relationships between harvesting practices and CO_2 emissions. Such data could be used to investigate how timber extraction practices might be changed to reduce CO_2 emissions from this activity.

3.4. The REDD Carbon Market Structure

This section explains the basic elements of the projected REDD Carbon Market which is expected to emerge as the REDD initiative gains greater understanding and international support. While Indonesia will contribute to the form of the market as a member of the UNFCCC and a leader in the development of REDD, many aspects of the market structure will be beyond the country's direct influence and dependent on the influences of international and corporate buyers, the interests of whom are described here to complete the context of the market to which Indonesia will need to establish readiness.

There are strong financial reasons for Indonesia to prepare itself as a REDD carbon credit seller. Assuming that carbon prices lie in the range of US$ 7-20 per tonne CO_2[36], and a 50% reduction in emissions from deforestation and forest degradation can be achieved (equivalent to 2.4 Gt CO_2 per year), the size of the carbon market for REDD globally could be in the order of US$ 15-50 billion (Rp 135-450 trillion). This value is far beyond the ODA funds of about US$1.5 billion, provided for the forest sector in developing countries. It is also much higher than the US$ 0.1 million value of forestry projects from A/R CDM.

Based on the same assumptions, the potential financial benefits for Indonesia through REDD are also very substantial. For example, if the speed of deforestation can be reduced by 25% below current rates (see Table 4 and 6), and the price of carbon is just US$ 5 per tonne CO_2, REDD could deliver US$ 0.65 billion annually. This rises to US$ 5.00 billion if the rate of deforestation is reduced by 50% below present rate and the price of carbon is US$ 20 per tonne CO_2.

[36] Current price on REDD voluntary market is between 10 and 18 US$ per ton CO_2

3.4.1 Concepts

3.4.1.1 What is the basis for the carbon market?

Carbon markets operate in a similar way to those for any other traded commodity, but with two important differences: the intangible nature of the commodity, and the important role of regulation. In carbon markets the commodity being traded is usually a tonne of carbon, but, being invisible, it is hard to track and measure, giving rise to complex technical processes and high risks. It is therefore very important that the seller is able to cultivate trust among potential buyers through consistent demonstration of good governance.

International public regulation has played an extremely important role in creating carbon as a commodity, and in driving demand in the markets, particularly since 1997 when the Kyoto Protocol, which sets mandatory emission reduction targets for Annex 1 (developed) countries, came into force.

There are two main markets for trading carbon: the compliance market and the voluntary market (see Table 13 for a comparison of their main features):

- The **compliance market** consists of three different trading mechanisms operating under the globally agreed rules of the Kyoto Protocol. They include
  - Emissions Trading,
  - Joint Implementation (JI); and
  - Clean Development mechanism (CDM).

  Only the CDM, in which Annex 1 countries can claim credits from projects which reduce levels of greenhouse gases in non-Annex 1 (developing) countries, offers potential benefits for developing countries from carbon finance. The value of the CDM market was US$6.2 billion (Rp 56.5 trillion) in 2006 and it is growing rapidly. However, less than one percent of the CDM trade is related to afforestation and reforestation.

- The **voluntary carbon market** are smaller markets operating outside internationally agreed rules. They consist of voluntary allowance markets (where companies take on voluntary emissions targets and trade their allowances); and project-based crediting mechanisms similar to the CDM. Individuals, corporations and other organizations without mandatory emission targets may enter into these markets, driven by social responsibility concerns to reduce emissions. The value of the voluntary carbon market was estimated at US$92 million (Rp 828 billion) in 2006 and is expected to have doubled in size during 2007.

The types of projects that can generate credits include emissions reduction projects (e.g. renewable energy or energy efficiency projects) and carbon sequestration projects (e.g. afforestation and reforestation) and carbon capture and storage projects.

A key difference between the compliance and voluntary markets is that the only forestry projects currently allowed in the compliance markets are concerned with afforestation and reforestation projects. Voluntary markets already allow REDD projects and a number are already in development in Indonesia.

One reason Voluntary Carbon Markets have adapted quickly to the proposals which REDD proponents have put to them is the importance of demonstrable good governance. Because trading in REDD carbon credits is targeted at buyers characteristically concerned with environmental ethics and social responsibility, there is an incentive for the sellers to ensure good governance practices can be guaranteed. While this may be possible in small to medium size projects the concern for good

governance could conversely work against the expansion of VER instruments and their up-scaling from relatively small projects to national or sub-national strategic initiatives where independent and respected rules of compliance will need to be followed to regulate risk to buyers and sellers. When a REDD Compliance regime is introduced it is likely that the voluntary market will cease to expand and may retract as it will be attractive only to specialized proposals. Nevertheless, voluntary markets will probably continue to play a role as they will continue to offer flexible solutions to smaller community based projects, or those targeting biofuels. The unique qualities of bamboo in sequestering and storing carbon also mean that projects involving bamboo may also find an important pathway to carbon trading through the voluntary markets. This flexibility may be particularly important to Indonesia where the complexity of social organisation and regulation, while an impediment to large scale regulation offer opportunities for locally packaged projects.

Table 13. Main features of Kyoto and voluntary markets

	Kyoto (CDM)	**Voluntary**
Size in 2006	3.9 billion Euros	$92 million
Commodity	CO_2eq (equal to one ton of carbon)	Normally CO_2eq (equal to one ton of carbon)
Legal framework	Regulated under Kyoto Protocol	Unregulated
Buyers	• Developed country governments, regulated private sector or individuals • Primary motivation is regulation	• Anyone, but normally unregulated private sector or individuals • Primary motivation is social responsibility, profit or preparation for regulation
Sellers	• Project developers in developing countries • Often larger projects with few links to communities	• Project developers in developed or developing countries • Often smaller projects with more links to communities
Forestry projects receiving credit	Afforestation and reforestation	Afforestation, reforestation and reduced deforestation
Monitoring, reporting, verification and reporting processes	• 7 stage CDM project cycle • Third party verifiers	• Variable project design processes • Third party verifiers often required

Transactions in both the compliance and voluntary markets take place between sellers who produce carbon credits through emissions reduction or sequestration projects; and buyers of credits who use credits to meet regulatory or voluntary commitments. This usually occurs via intermediary organizations such as brokers or secondary buyers (e.g. traders and funds that buy for others and take on some of the risks) as the transactions can be difficult for buyers to manage themselves. Surrounding these transactions is a range of institutions which facilitate trading. For example, in the compliance market, the EU Emissions Trading Scheme (EUETS) has been established to allow trading of carbon between industries in the EU. The Chicago Climate Exchange is a similar voluntary trading platform set up in the United States.

Other institutions and processes have been established to reduce risks associated with the markets and projects. These include third party verification organizations that verify credit quality, registries for tracking movements of credits and expert review processes for checking the quality of reporting. Standardized project development cycles, such as the 7-stage CDM *project cycle*, have also been developed to improve project design and the quality of credits.

3.3.1.2 How might the international REDD markets develop?

There are a number of options for the future of the REDD carbon market depending on the type of international agreement that is reached and the design of REDD systems by national governments (Figure 15). The main factors which influence these possible forms include:

- Whether a negotiated agreement is reached at the international level. Agreement would result in either a compliance-based system operating under international rules. No agreement would result in REDD projects being established in a voluntary market-based system with no international rules;

- Whether the financial mechanism is market or fund-based. Market based mechanisms would involve the trading of carbon credits within international carbon markets. Fund-based systems would rely on payments from multilateral funds, similar to current Overseas Development Assistance (ODA);

- Whether the credits in any market-based system are *fungible* (transferable) with other credits in the carbon markets, or traded in a system under a separate protocol. If they are *fungible*, then credits for REDD would be tradable within markets for credits that include energy and energy efficiency projects. If they are traded under a separate protocol then a new market only containing REDD credits would be established;

- Whether incentive payments are made to national governments, or to entities at sub-national levels (e.g. lower government levels, unit management levels or projects); and

- The reference scenario used for measuring progress and making incentive payments.

Three of the most likely possible combinations of these options and their characteristics are compared in Table 14.

Table 14. Characteristics of the three REDD market mechanisms

Characteristics	**National Carbon Credit Market Mechanism (to comply with the Emission Reduction Target following the Kyoto I Commitment, *Compliance Market*)**	**Voluntary carbon market REDD incentives**	**Fund Based-REDD Incentive**
Scale	Possibility of generating large revenue streams of 1-17 billion USD per year in Indonesia, depending on assumptions used	Much smaller scale than compliance system. The value of voluntary carbon markets is currently about 0.3% of the overall value of global carbon markets	Scale unclear but likely to be much less than the market-based compliance option
Prices	The price of a carbon credit will follow market demand, determined partly by the size of post-Kyoto	Prices likely to be low compared to compliance system.	The total of the fund to be provided for REDD is likely to be relatively small compared to those available

	commitments. Prices are likely to be higher than in voluntary markets.		in market mechanisms.
Payment timing	Payments likely after emissions reductions have been verified to reduce risk	Buyers more likely to take on risk that credits will not occur and make up-front payments	Both ex-ante and ex-post payments possible
Basis for payment	The size of the incentive provided will be based on the size of the emission reduction compared to the national/sub-national reference emissions	The size of the investment will be based upon the extent of the emission achieved compared to the reference emission level and commitment of the project.	The size of the fund to be provided will depend upon agreement, likely to be based on the size of the emission reduction from the reference emission level or on other considerations not directly related to carbon, such as conservation of biodiversity
Standards and regulations	Standards and regulations will be binding at the international level with a system of high accountability so as to maximise the value of the payment transactions and ensure comparability of credits across the market.	Standards and regulations likely to be less strict and rules more flexible between projects. As regulatory pressure in Annex-1 countries is not the main driver of the market, social and environmental 'co-benefits' could be important motivations for implementing projects.	Standards and regulations likely to be less strict than for market based mechanisms as there is less need for comparability of emissions reductions units and funds are designed to provide assistance to the country receiving the fund.
Central government involvement	The level of government involvement in the system is likely to be high, with the government acting simultaneously as a seller of credits to international buyers, a buyer of emissions reductions from sub-national schemes, a regulator of the system and/or an intermediary	Likely to be less than in a compliance system because transactions are more likely to be between international buyers and projects, rather than with national governments as sellers themselves. This could avoid capture of the system and finances by higher levels of government but could also result in implementation of activities that are not in accordance with government objectives.	Level of government involvement is likely to be high. The government will receive funds from international donors and redistribute these through existing or dedicated REDD funding mechanisms
Commencement of system	Activities likely to commence in 2012 but there is scope for early action to reduce emissions to be rewarded	Activities will be able to commence immediately because they are not dependent on international negotiations	Activities likely to commence in 2012 but there is scope for early action to reduce emissions to be rewarded
Liability	In forward contracts for the purchase of credits the central government is likely	In forward contracts for the purchase of credits the project developer is likely to take on	Central government likely to be liable for non-delivery of emissions reductions,

	to take on some liability for non-delivery, although this may be transferred to other actors at sub-national levels depending on the way the system is set up.	liability for non-delivery, although this could be transferred to other stakeholders in the project through contractual agreements	although this may be transferred to other actors at sub-national levels. Less stringent standards and regulations relating to funds mean that liability will in general be lower than for market mechanisms.

From a buyers' perspective the future market structure that will have the most influence on behaviour will depend on which of the following four options develops.

1. A National crediting scheme under a UNFCCC agreement. This scenario assumes the establishment of a national reference baseline for emissions from deforestation. Any verifiable reduction during the crediting period would result in REDD carbon credits issued to the host country's central government. These REDD credits could be *fungible* with credits generated through other abatement measures. Separate markets could be established by agreeing on specific REDD targets to be met through credit purchases by developed countries in a separate Protocol to the UNFCCC in addition to a Kyoto-post-2012 successor; or by agreeing on REDD and non-REDD targets within the same Protocol. All options would realistically be restricted to mandatory targets for industrialized countries with developing countries providing REDD credits on a voluntary basis. National-level REDD crediting would represent a voluntary sectoral crediting approach which is starting to be discussed also in other policy areas of the UNFCCC process. An agreement involving national-level crediting need not be incompatible with the option of project-level crediting.

2. Project crediting scheme under a UNFCCC agreement. This scenario, like option 1, would allow tradable carbon credits for REDD to be issued in developing countries. However, the level of carbon accounting and crediting would be a (sub-national) project rather than an entire country. This key difference makes this scenario similar to existing CDM projects, where project-specific baselines have to be established against which emission reductions are measured. In the case of REDD, national baselines might still function as the reference scenario even for project-based crediting, or at least be taken into account for project-specific baselines. Sub-national administrative units, such as Districts in the case of Indonesia, could become *de facto* project proponents and generate REDD credits from the forests under their jurisdiction. Again, REDD credits may or may not be *fungible* with other segments of the regulatory carbon market. An agreement involving project-level crediting need not be incompatible with the option of national-level crediting.

3. International fund with national-level incentives. The key difference in this scenario is that incentive payments for REDD would come from a dedicated international fund rather than from carbon markets. Such a fund would on voluntary contributions by governments or other donors. Financial incentives from the fund could be calculated in a similar way as to that used for market-based options. A fund could provide incentives on a national or project level basis, although payments to national governments are the more likely policy scenario. Incentives and payments from a fund could also be based on measures or commitments that are not quantifiable in terms of the emission reductions they achieve (e.g. policy reforms and implementation). The scale of payments would depend on available donor funds with carbon prices and overall capital flows determined by the supply and demand for credits by governmental and private actors.

4. Voluntary markets only (without international agreement). Voluntary markets for REDD already exist and can be expected to grow in the future along with other generally expanding voluntary markets. Credit-based incentives from these markets could be the main remaining source of REDD funding if no international agreement can be reached. This option would focus on project-based crediting. Voluntary markets could also be tapped by projects even if a regulatory REDD market is created. Voluntary markets are a fall-back option for the international REDD process, as well as an ongoing complementary source of carbon finance.

In general, a market and credit-based international policy scenario can be expected to put greater emphasis on outcome-based incentives issuing credits after emission reductions from REDD have been achieved and verified; whereas an international fund could be more flexible in providing upfront (*ex-ante*) payments. This has implications for the scope national governments have to provide upfront (*ex ante*) incentives.

Estimating the future value of market-based REDD systems is subject to assumptions about possible market architecture and factors which govern demand for credits, volumes and prices. It is therefore impossible to be definitive at this stage. In the compliance market the variables that will influence market value include:

- The stringency of future Annex-1 country emissions targets which will drive demand for emissions reductions credits;
- The number of countries adopting reduction targets (e.g. whether the USA joins);
- Level of achievement of the 1st CP emission reduction target; and
- CDM performance in other sectors which could determine how attractive REDD credits are in comparison;
- Caps on the use of REDD credits, which might be put in place to reduce the risk of the market being flooded with cheap credits;
- Whether it is allowance-based or project-based

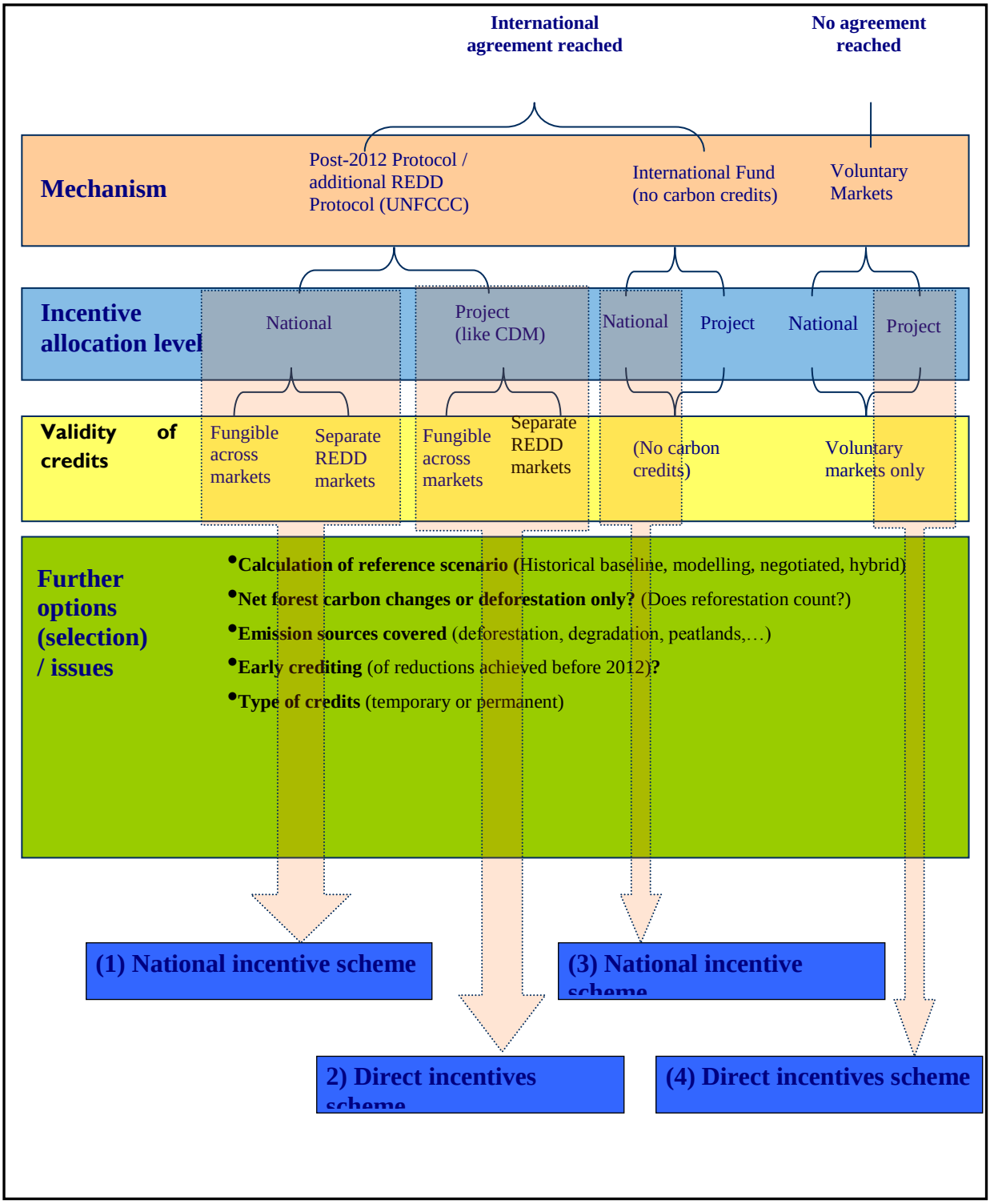


Figure 15: Design of a REDD Market

3.4.1.3 What role will the buyers play in the development of the market?

The attractiveness of Indonesia's REDD credits to buyers will largely determine its share of the projected $1-18 billion REDD market. The extent of forest in Indonesia and its history of forest loss contribute to the very high potential for the country to gain from the REDD market. The country loses some 204,000 hectares of natural forests per year (see Table 4). By conservative estimates, this represents some 495 million tonnes in annual CO_2 emissions.

Buyers, whether governments, financial institutions or private sector purchasers, will seek out REDD projects that guarantee credible emission reductions while minimizing the risks and costs of creating them. In this respect, the REDD market will be a competitive one resembling those for other global commodities. REDD credits, however, are also a performance-based commodity. The product – a ton of greenhouse gas emission reductions -- represents a real change to forest carbon stocks maintained above a negotiated baseline. This depends on credible governance and a strong regulatory framework to mediate transactions, reduce transaction costs and assure buyers of quality emission reductions balancing risks and returns.

With its natural endowment of forests, Indonesia can be in a competitive position by establishing a REDD carbon credit production process credible to international buyers. The government's most effective role will be as an efficient regulator of a REDD policy designed to contain rent-sinking, minimize transaction costs and encourage private investment into the sectors capable of achieving the greatest emissions reductions while meeting national sustainable development goals. In order to achieve these objectives Indonesian regulatory agencies will need to demonstrate sensitivity to the structure and demands of international private or government carbon buyers. Three basic players operate in the carbon markets:

- End-users that apply carbon credits to offset their own emission reduction goals,
- Generators of carbon credits from projects; and
- Their intermediaries.

Buyers may also be users, carbon funds (including carbon facilities), or traders. Brokers may act as intermediaries between providers and all types of buyers. Buyers for carbon-credit products can be categorized as shown in Figure 16.

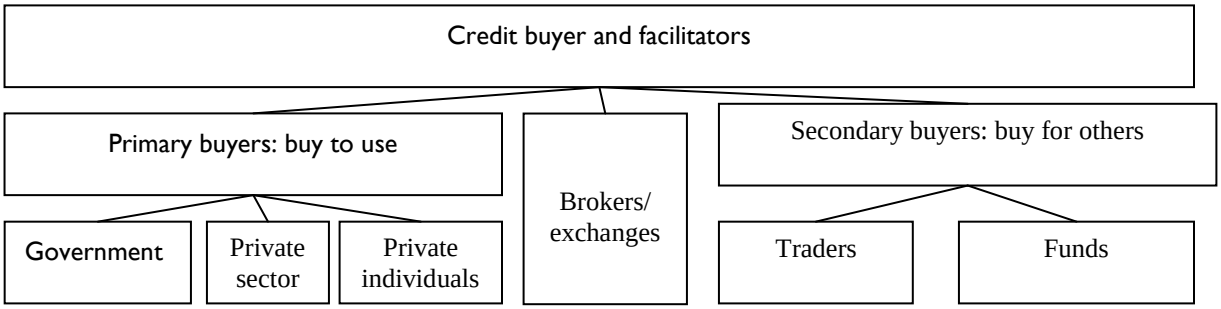


Figure 16. A classification of carbon credit buyers

Buyers consider many factors when purchasing carbon credits, but will focus their attention on three main issues:

- **Credit quality** relates to risk but also includes factors such as the monitoring

Methods, and the potential for projects to deliver social and environmental benefits.

- **Cost of credits** are related directly to the operational costs of implementing monitoring and maintaining projects, as well as transaction costs from factors such as trading credits and rent-seeking activities.

- **Risks** primarily diverge into:
  - project risks linked to investment returns and credit price;
  - political risks involving country-specific governance issues;
  - market risks linked to fluctuations in demand and supply, and
  - regulation and structure of REDD design issues such as permanence and leakage.

Credit Quality is determined by how well a project creates real and verifiable net emission reductions that extend benefits across a spectrum of socio-economic and environmental factors.

The exact criteria will evolve through market preference and guidelines established under international agreement. Although criteria developed through project activities conducted under the Kyoto Protocol, or the voluntary market, will inform this process, it is likely that quality will be defined by specific issues of permanence, leakage, *additionality*, liability, transparency and co-benefits that are collectively validated and verified by third-party auditors.

The issues of permanence, leakage and additionality are governed by technical aspects and have been defined earlier. Issues of liability, transparency and the concept of co-benefits are issues of governance, and international experience indicates that the perception of buyers of a country's performance in these areas is very important in setting the quality of the traded carbon.

The question of who has ***liability*** when losses occur after the credit has been sold is one of the main issues that need to be contractually fixed between seller and buyer. There are several types of contracts that allow for different liability assumptions where the buyer, seller or a third party is financially responsible for delivery risk of the carbon credits. Remedies in this process include:

- replacing undelivered carbon credits with those from other projects,
- seeking damages,
- mandating extra production of carbon credits in a later period or ending the contract; and
- claiming advance payment from the seller or third party.

National credit pools, government guarantees or insurance instruments may play a role here.

Transparency in the creation and management of REDD projects will profoundly influence how investors regard the risk profile of projects. The REDD payments should be fully transparent and managed according to international financial standards and Indonesian law. Monitoring, auditing, and exposure to public scrutiny and control should be handled by independent bodies, including civil society organizations.

Credits emanating from REDD emission reduction at a national scale will be valued more if they also produce environmental and social ***co-benefits***. Small and large land holders, agricultural and forest communities, and national and local government can all benefit from the revenue that REDD generates. Environmental services of standing forests including water flow management, biodiversity,

carbon storage and marketable products also accrue to local stakeholders as well as the general public. One of the objectives for REDD projects will be to identify and develop these benefits as incentives for REDD activities. These can make projects and the credits associated with them easier to sell to certain buyers, especially in the voluntary markets where demand is often driven by ethics and corporate social responsibility concerns, rather than regulatory pressure

If Indonesia is able to demonstrate a commitment to improve the social conditions of its poor through, for example implementing sustained forest management to deliver financial and ecological benefits to local communities and private firms from the county's forests; the effort could be expected to resonate among many of the emerging major buyers.

Almost all international buyers demand independent certification against credible standards during carbon project development and operation. This is intended to ensure that quality standards are met and evaluated consistently over the lifetime of the project. It is likely that REDD projects will rely on a similar mechanism to guarantee quality and lower the risk of failure due to non-compliance with REDD protocols. Standards and labeling systems help to ensure buyers of social and environmental 'co-benefits', and enforce systems in place to guarantee emissions reductions have occurred. Similarly, the existence of a national or international registry will be critical to guard against double-counting (selling the same credit twice) and guaranteeing the integrity of the system.

Cost of Credits. Buyers of REDD projects will gravitate toward least-cost options that balance reasonable levels of risks and return. This suggests investment will flow toward REDD opportunities that target projects with low-opportunity costs, large volumes of credits to take advantage of economies of scale and portfolio strategies that minimize risk.

While the costs per ton of REDD credits and the payment structure (upfront payment or floating prices, delivery or purchase guarantees) are still unknown, data for existing compliance market prices of forestry projects suggests a price of about $4 to $10 per ton of CO_2e for REDD transactions. On the voluntary market, forestry carbon credit prices cover a wide range from around US$3.80 to $8 per ton. However, the primary determinants of price for REDD credits will be the structure of a compliance REDD market affecting demand, as well as costs that project developers must incur to produce credits. Future price discovery will rely on more transactions that accurately reflect the true cost of REDD implementation in various countries.

Carbon credit buyers will prefer low-risk projects that ensure timely performance, as well as sustained delivery and permanence of high-quality emission reductions. REDD projects are exposed to risks inherent to any 'normal' forestry project related to project financing or implementation issues, as well as certain carbon-specific risks. Existing carbon markets have shown that higher risks often do not prohibit the development of carbon projects, but that they can significantly influence the prices paid for the credits.

Risk. There are three different forms of risk involving carbon projects: market risk, operating risk and political risk.

Market risk stems from the potential for prices to be lower than expected due to lower demand or increased supply from competitors or substitutes. Market risks can be managed by buyers by entering into long term purchase agreements with sellers or third-parties allowing the balance of risk to be adjusted.

Operating risk stems from project performance and would increase if the cost of operation and maintenance is higher than expected. This risk can be managed through careful execution of planning,

construction and operation, as well as agreements between the buyer and seller over performance requirements, financial penalties or corrective measures, and use of insurance. Forestry projects are also vulnerable to risks due to natural causes, market fluctuations and underlying factors such as governance. From the perspective of buyers, low risk profiles are attained through due diligence reporting of funding, land tenure security, assessment of country risks and clear business plans. Mechanisms to compensate for project failure such as insurance schemes or credit reserves may also be required. Figure 17 provides an analysis of project operating risks on carbon prices.

Political risk involves country-specific governance issues and the negotiated structure of a future REDD compliance market. Political risk exists at the local, national and international scale, and the level of this risk will be critical to the success of any market in the future. Private sector involvement in the REDD market from the buyers' perspective demands sustained market confidence that national actors, and their sub-national parties, deliver real reductions in deforestation within a credible framework. Existing experience with regulatory, fund and market-based forest management in Indonesia indicate that performance will have to improve significantly for REDD to work.

There are also forms of risk specific to carbon markets. *Permanence* and *leakage* are particularly important in forestry projects. As discussed above, permanence relates to the question of how to ensure that carbon stored in trees is removed permanently from the atmosphere and it can be managed by issuing temporary credits for forestry projects. Leakage relates to the question of how to ensure that a project that avoids cutting trees in one area does not lead to trees being cut in another area. The project cycle for CDM projects is illustrative in this regard as it shows the impact of different risks on the price of a CER during the carbon project development phase. Political risk poses a relatively large risk in this market.

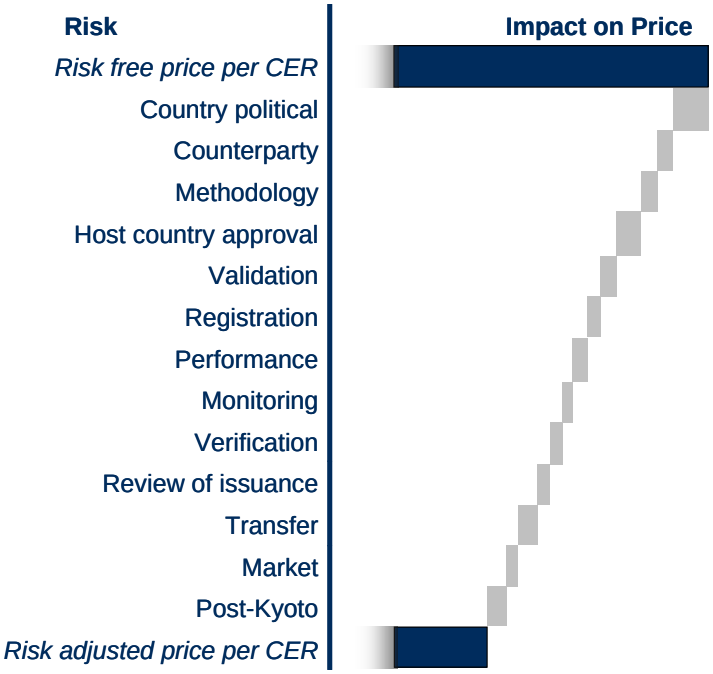


Figure 17 - Impact of project-cycle related risks on carbon prices

3. 4.1.4 What are the financial and risk issues for sellers of carbon?

The way carbon projects are set up around the interests of (Annex 1) buyers raises a set of financial and risk issues for the sellers of carbon credits. Similar issues are likely to be relevant in future REDD systems whether the sellers are national governments, or sub-national governments or other actors.

Financial issues relate to transaction costs, project size and the timing of payments, implementation costs, proportion of finances generated from carbon sales, and the availability of up-front capital. Small projects have similar transaction costs to large projects, so that there is an issue of a size threshold influencing the economic feasibility of a REDD project.

Transaction costs are largely up-front expenses, which can be a problem for small producers. These costs can be reduced through small-scale methodologies such as *bundling* of projects or implementing programs of activities (commonly called *programmatic CDM*[37]). Options for up-front financing in the project planning phase include government tenders and carbon funds, funds from private sector CDM project developers, and funds from the project hosts.

Implementation costs are not well known for REDD, but include measures for lower deforestation, rule enforcement and monitoring. These costs are likely to be significantly affected by external factors such as demographic changes, immigration and conflicts over land. Carbon finance is generally a small part of CDM projects, meaning that projects have to be financially viable without carbon finance. If this is the case in REDD such financing might need be raised through ecotourism, the sale of non-timber forest products or timber produced through sustainable forest management, through bundling with other ecosystem service payments, and/or with co-funding from national revenues, or international funds similar to those listed for provision of upfront financing.

Given the high risks related to forestry carbon projects and the financial constraints, carbon contracts are essential for both buyers and sellers. From the seller's perspective it is particularly important to ensure that they are not bound into an agreement in which they could lose money, or be liable for project failure that is out of their control. In existing carbon markets four main aspects of contracts are important for sellers:

- ***The specifications of volume and time frame of delivery***. Given the uncertain quantity of carbon credits the seller needs to ensure flexibility as to the volume and time frame for delivering credits.
- ***Payment schedule.*** Sellers will want to ensure that some proportion of payment is made upfront.
- ***Price setting***. The seller will want to ensure that they get a good price for their credits. The contract could establish a fixed price for each carbon credit, but there is a risk that the seller could lose out if the market price for credits rises over time, in which case they might opt for and indexed price option;
- ***Liabilities.*** The seller will need to ensure that they can meet liability rules if they fail to deliver credits, which might include payment of damages to buyers or replacement of credits. They will

[37] Program of Activity (PoA) is a voluntary coordinated action coordinated or managed by entity, which implements a national policy/measure or stated goal, which leads to GHG emission reductions or increase net greenhouse gas removals by sinks that are additional to any that would occur in the absence of the *PoA*, via an unlimited number of *program activities.* While *Program activity* is a project activity under a *PoA*

also need to establish rules for compensation from buyers if they do not pay, for example through charging interest or claiming damages.

The contractual arrangements between buyers and sellers in national REDD systems (whether they are upstream between international buyers and national governments, downstream between national governments and sub-national entities, or between international buyers and projects) will be important to consider to ensure that sellers of credits are not disadvantaged, or subject to large liabilities for failure to deliver emission reductions.

Mechanisms to avoid the failure of delivering emission reduction should be developed. When carbon credit from REDD is exchangeable with regional climate mitigation credits (e.g. CER, ERU and/or VER[38]), then it is logical that the non-Annex 1 countries who committed to implement REDD can also used CER generated from CDM projects to replace the undelivered REDD credit.

3.4.2 The situation in Indonesia

Carbon projects underway in Indonesia have the potential to sequester and maintain carbon stocks across millions of hectares of forest from Aceh's ecosystem to the Papuan highlands. REDD has the potential to be the major component of this initiative. Government, research organizations, NGOs and their private sector partners are laying the foundations for REDD projects in anticipation of growing demand for forestry-derived carbon credits. Figure 16 presents current thinking in the IFCA studies of the design elements needed in a REDD carbon market.

Under the proposed market scenario, REDD activities will generate performance-based carbon credits through real, transparent and verifiable emission reductions. Project developers, local communities, government agencies and others who assume risks in developing these projects will be compensated based on the volume of credits generated, as well as from conventional revenue sources. Premium prices for credits will be guaranteed to those sellers who can validate the quality of the credits in terms of permanence, high precision monitoring and good governance procedures.

The IFCA analysis has shown that a national-level, market based crediting system, incorporated in the successor to the Kyoto protocol; or as a separate UNFCCC protocol, will provide a robust REDD framework due to the integrity of national carbon accounting and the strength of financial incentives.

However, critical design elements of this type of REDD market have not yet been settled at the international level, or formally endorsed by the Indonesian government. Structural elements of REDD will be the subject of intense discussion by international negotiators at the next UNFCCC conferences

.These elements will include:

- the nature of a REDD finance mechanism through an international compliance market, fund-based or an alternative scheme; and
- the scope of carbon accounting within a national or sub national framework (and various hybrid proposals).

The results of the negotiations will profoundly shape the post-2012 climate management regime, and the potential market for REDD credits. For example, the choice of a market or a fund-based mechanism will dictate whether suppliers of such credits are:

[38] CER, ERU and VER are carbon credits resulted from CDM, JI and non-Kyoto carbon projects respectively.

- central governments;
- individual projects in host countries, similar to the current CDM system; or
- a combination, involving credits devolved from national actors to the sub-national or project level.

In the interim, Indonesia can lay the foundation for this proposed system by building the institutions and legal framework to support REDD project development until policies unique to a national, and ultimately international, REDD regime are endorsed.

Indonesia's preparations to enter a potential REDD market are currently well advanced relative to other tropical forest countries. REDD demonstration activities are in the preparation phase for areas of Kalimantan and others ,. The legal framework for REDD is progressing through the Ministry of Forestry and is expected to be completed by the end of 2008 or early 2009. Internally, the Government of Indonesia (GoI) is negotiating a mandate for REDD activities among ministries and agencies.

The GoI is appointing a Presidential Commission on Climate Change with cross sectoral membership and the Ministry of Forestry has formed a working group to examine what criteria could regulate private-sector REDD activities. National and sub-national authorities are expected to deliver decisions further clarifying the guidelines for a REDD market, while a larger harmonization process will address regulations to bring consistency to the decentralized government authority.

The governance issues that apply to any market also apply to REDD. Property rights, legal transparency, judicial recourse, and other structures are critical to ensure the legal certainty of commercial transactions. They are recognized by the Government as issues to be fully resolved in establishing REDD.

3.4.3 Challenges to achieving readiness

REDD demonstration activities during the *Readiness Phase* 2008-2012 should provide lessons on the design of a domestic REDD incentive mechanism. They must be:

- clear and simple for buyers and sellers;
- attractive to international investors; and
- operate within a transparent legal framework.

Rules and regulations established for a future system, tried and tested today, will be more likely to create an efficient REDD market in the future.

Because REDD has the potential to radically change the way forest resources are defined and used, strong political leadership will aid its effective realization. The political dimension will assist demonstration activities which fix conflicting laws, promote enforcement where essential, and encourage legal transparency. Cooperation among leaders at national, provincial and local levels of government will facilitate the necessary new understanding and institutional capacity building to prepare agencies and organizations to participate in a REDD market. Government can address these challenges on two levels:

- By reconciling competing policy objectives of national and sub national stakeholders; and
- By implementing project-level rules that will ensure REDD projects produce cost-effective, marketable credits.

These activities will require socialization, discussion and agreement about the form of the mechanism that will comprise the national structure and governance steps that increase the security for project developers, sellers and buyers interested in creating REDD credits in Indonesia.

At the national level, a national registry will soon be required to guarantee that benefits from early crediting provisions will be awarded at a later date, and to avoid loss of trust in the system due to double counting. Governance measures that build on recent successes in combating crimes like illegal logging, and curbing corruption, can also contribute to the government's clearly stated development stance of pro-growth, pro-poor and pro-employment. These goals should be explicit in a REDD policy that is compatible with an international market for high-quality forest carbon credits.

A great deal of work is underway to improve forest management schemes and land tenure. The Ministry of Forestry has already begun drafting revised *environmental services* regulations. In its draft form, the regulations cover protection, production, conservation and community forests as well as the range of parties that manage, finance and broker these projects including local communities, national/provincial joint ventures, cooperatives, private firms and national park managers and other newly established institutions. Specific REDD guidelines is also prepared.

Sellers in a future REDD market will face a web of legal structures in deciding how to sell environmental services such as REDD credits. The most sophisticated groups have already navigated some of these challenges, secured financing and advanced to generating carbon credits. Others will need a great deal of assistance and guidance to successfully execute a project in Indonesia's forest estate that may benefit most from management for REDD.

From a technical standpoint, sellers of REDD at the project level can benefit from training and assistance in the REDD legal framework and practical aspects of project management. This may take the form of a national REDD Payment Mechanism that will regulate and mediate transactions among REDD actors. The following issues have been identified as crucial issues for sellers under a REDD regime:

- Liability
- Pricing
- Financing
- Contracts and mediation
- Risk management

The final issue: a clear and transparent framework for payment distribution, is dealt with separately in section 3.5

Liability issues, as part of any REDD framework, must be explicitly defined in order for private initiatives to occur. While a REDD framework under the UNFCCC may ultimately determine an international arrangement, domestic legislation is required to aid parties immediately seeking to develop projects. Sellers need to ensure that they can meet liability rules if they fail to deliver credits, which might include payment of damages to buyers or replacement of credits. Conversely, rules are also required to determine compensation for sellers if buyers default on REDD purchases. Project developers should also be protected through legal instruments that impose interest on payments or stipulate damages. The exact form of these liability measures may be government guarantees, carbon credit portfolios or other mechanisms requiring varying levels of government support. The most critical aspect in liability provisions will be to limit initial project risk and contribute to a diverse national portfolio of REDD activities that can sustain a future market.

Pricing of carbon credits from REDD activiites/initiatives will be determined in the contracts between sellers and buyers. However, experience with carbon credits in all CDM project sectors show carbon revenue usually only constitutes a small part of the projects' total revenue, increasing a project's internal rate of return (IRR) by about 1-2% in forestry CDM projects, compared to as much as 8% in fossil fuel projects. Since forestry projects usually require high upfront payments to cover implementation and opportunity costs, payments will need to come from an alternative source of income such as tourism, the sale of forest products or up-front financing from a private or public source. A possible solution to this problem may be a price floor for REDD credits, which correctly reflects the cost price below the official market price, or the creation of additional income through alternative funding and revenue streams such as from tourism and harvesting. The Government of Indonesia can establish policies that seek to minimize the risk of low prices, or offer favorable subsidies and fund-based financing.

Project developers must finance three phases of the project: planning, construction and operation. The primary sources of income during the planning stage are usually government and carbon funds, often paying a proportion of project costs in return for a contract to purchase credits, and project developers, public or private sector entities that provide internal funds to develop their own projects.

During construction, costs may be considerably higher. A typical CDM project has a budget in the order of US$20 million and requires equity and debt finance as well as equipment suppliers, credit buyers (particular for up-front payments against future CER deliveries)..

The method of payment will be important to an effective REDD payment mechanism. It should allow different methods of payment for carbon credits and non-carbon credits. Buyers can settle their transactions by paying cash, debt swap, or financial assets such as carbon financial instruments; and, if the parties involved in transactions are governments, payments can be in the form of forgiven debt. Buyers and sellers should also be able to settle their transactions by providing carbon financial instruments (CFI) that can be traded in international climate exchanges.

The range of financing options from equity purchases to micro-credit loans or debt may be difficult to access for firms or groups unaccustomed to project finance. The national REDD Payment Mechanism may offer guidance or financial management expertise to access these funding sources across a wide spectrum of project actors, as well as offering favorable financing of its own.

Contracts and mediation will require a national REDD framework which should include a payment mechanism to facilitate financial transactions between supplier or sellers and buyers of REDD carbon credits. Contracts for REDD credits will be likely to include mandates for change in forest policies and practices to be implemented; methods for verification of baseline carbon stocks and periodical carbon stocks; price of carbon, and a method of payment. Clauses may also need to deal with complex subjects such as:

- Specifications of volume and time frame of delivery. Given the uncertain quantity of carbon credits the seller needs to ensure flexibility as to the volume and time frame for delivering credits.
- Payment schedule. Sellers will want to ensure that some proportion of payment is made upfront.
- Source of the payment (freely usable financial capital, investment in public services, trust funds for specified activities)

- Conditionality of payments and service delivery (with conditionality expressed at the level of the service; the condition of the land cover; the activities of the 'seller', and/or, the community-scale management of the resources)
- Pricing in relation to the opportunity costs (options forgone) for the seller and the costs of alternative provision of the service to the buyer

Again, project support through some sort of national REDD Payment Mechanism or other entity will aid sellers and buyers of carbon credit enter contractual agreements and voluntary agreements and will settle their payments according to these types of contracts.

Managing investment risk is an important consideration because payment from REDD incentives will be subject to corruption, fraud, and other irregularities common in any incentive mechanism aimed at protecting the environment. Review of current and past environmental incentives shows many of these incentives have failed to reach their targets for this reason.

To avoid misappropriation of REDD incentives the payment mechanism must be accountable, auditable, and transparent. It should involve government auditor agencies, private accountants, the Financial Intelligence Unit, and the Anti Corruption Commission. Each agency could play a part in preventing irregularities and enforcing the REDD incentive mechanism. The recipients of REDD incentives and any other parties, including brokers should also be subject to the same rules.

3.5 Payment Distribution Systems

3.5.1 Concepts

3.5.1.1 What is a Payment Distribution System?

The objective of a REDD payment distribution mechanism is to support policies and measures that reduce deforestation and degradation through transfer of revenues from international REDD funds or carbon markets to (or within) national levels to the responsible management agents. A well designed PDM will provide three benefits:

- Shared responsibility for reducing a major driver of global climate change,
- Financial payments and co-investment that exceed the economic opportunities foregone from decisions to maintain carbon stocks, and
- Co-benefits through the other environmental service functions that well-managed forests can provide.

To ensure verifiable results on emissions reduction, these mechanisms must be effective in targeting the wide range of agents involved in deforestation and degradation. They must

- reward good performance;
- provide an incentive for improved performance compared to reference scenarios; and
- adequately compensate agents that suffer losses from changed practices.

International payments are likely to be performance based, both in terms of emission reduction at national scale and the environmental and social impacts of the system. Accountability, transparency, risk management, adequate benefit transfer and administration mechanisms will be essential for attracting investment. Indonesia will be effectively competing for attention for REDD funds with other

countries with high emissions and/or large forest areas. A strong international bargaining position requires that internal conflicts and strategic positioning be overcome.

3.5.1.2 What are the challenges for a national REDD payment mechanism?

An effective national REDD mechanism in Indonesia will have to find an appropriate balance between environmental, economic and social issues. This is because a focus on any one of these dimensions will be unlikely to achieve permanent emissions reductions. For example, a focus on efficient reduction of emissions alone is unlikely to have a long-term impact on the drivers of deforestation and could result in negative impacts on people, leading to further deforestation. Triple accountability requires the emergence of incentive systems that are:

- Efficient in reducing emissions at affordable cost, linking local to international scales in ways that are accountable for emissions but that are as simple as possible;
- Address *climate justice*, equity and fairness, within improved systems of governance and accountability from local to international scales;
- Support transformations to sustainability for the long term within the local context of options and aspirations, and
- Express a commitment to learning and accountability for the process.

Each of these principles raise a set of challenges for Indonesia, which it will have to overcome if it is to reduce its net emissions from deforestation and forest degradation and access REDD markets. These principles and challenges are summarized in Figure 18.

In putting the principles into practice a number of issues are likely to emerge that will affect the detailed design of the system: For example:

- Which areas, activities and actors can receive REDD funds?
- What influence do the various definitions of 'forest' have?
- How is the exclusion/inclusion of degradation and other land uses accommodated?
- How are the causes of emissions dealt with? For example, how is the impact of natural forest fires dealt with in relation to anthropogenic fires? This issue will influence risk sharing and insurance instruments and the level at which accountability lies.
- How will payment decisions deal with the complex mix of legal, semi-legal and illegal activities, which drive deforestation?
- How will the design of the system deal with trade-offs that have inhibited existing carbon markets, such as safeguards against risk increasing transaction costs?
- How will effective cross-scalar institutions be established that can deal with opportunity costs, liability and management arrangements arising in REDD at different levels in the REDD *supply chain*

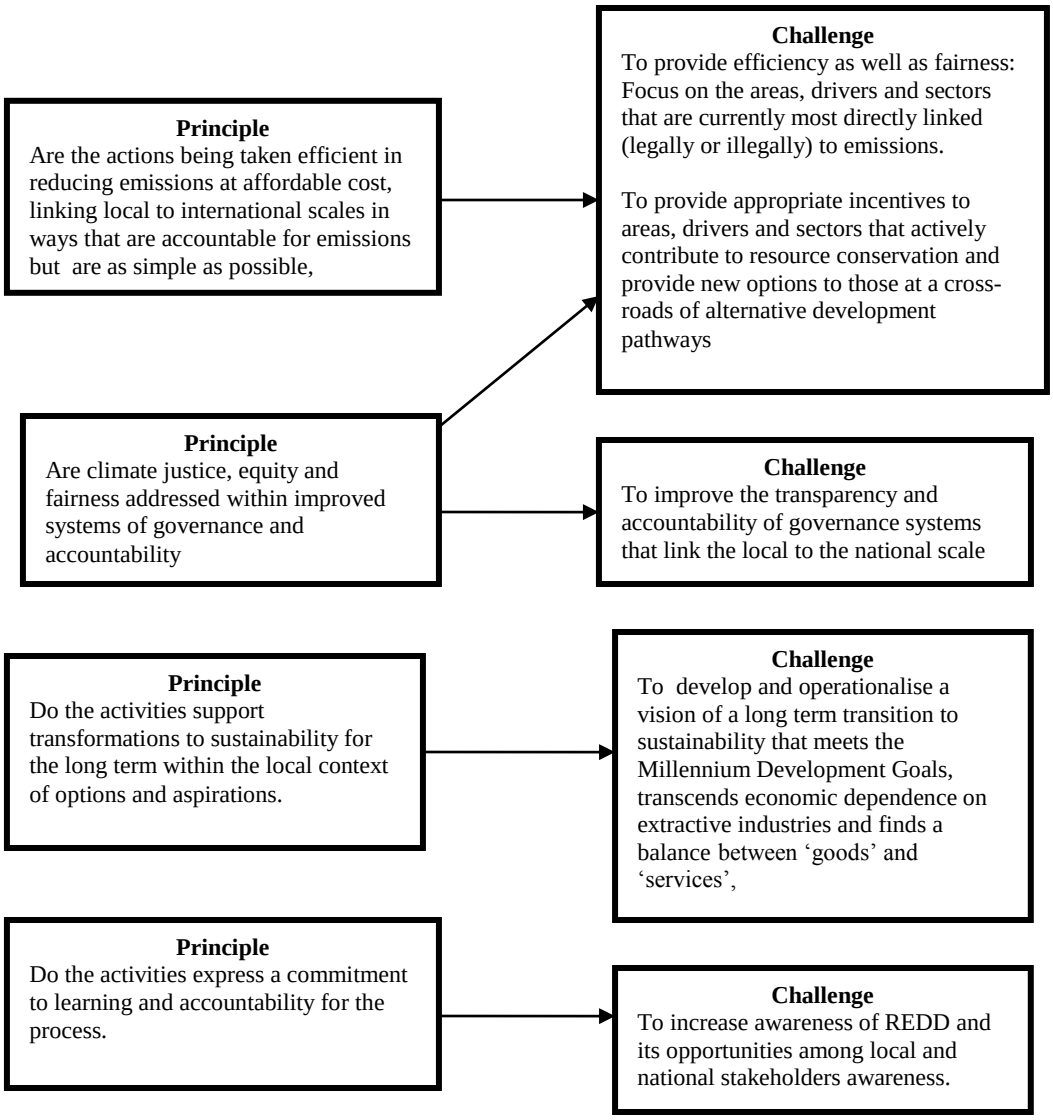


Figure 18: Principles and challenges for implementation of REDD and associated payment distribution mechanisms

3.5.1.3 How can improved governances optimize the impact of REDD Payments on Reduced Deforestation?

Payments and other incentives should be directed where they will have substantial, measurable impact to achieve REDD objectives to reduce deforestation at either the national or sub-national levels.

There are a number of different pathways through which REDD payments might be distributed. They are not mutually exclusive and could be used in combination, or different payment mechanisms might be suitable for different kinds of payments, or in different sub-national regions. As stated earlier,

payments and other incentives should be directed equitably, transparently, and in such a way as to achieve REDD objectives to reduce deforestation. Incentives (and disincentives) can be linked to deforestation drivers at different levels of government, depending on where they are likely to have the most impact.

National-level drivers include the following:

- Forest and investment policies (including regulation of foreign and domestic investment in forest-based industry);
- Delineation and regulation of forest functions;
- Licensing of large wood-processing plants, logging concessions, and plantations;
- National tax and fiscal policy;
- National law enforcement policy.

Regional and local-level drivers are more directly linked to proximate causes of deforestation (illegal logging, encroachment, illegal and quasi-legal logging and land-clearing), so incentives to shift or deter these are more appropriately and effectively directed to, and through, local government agencies and civil society.

Schemes to improve livelihoods of forest-dependent people while reducing pressures on the forest have failed in the past in part because they operate too close to the forest edge and serve more as magnets that attract and keep people close to or inside the forest rather than pulling them away towards less forest-dependent livelihood options. This can be overcome by addressing the problem on a larger scale. Poverty alleviation funds that draw people away from, rather than into, forests—such as through agricultural intensification in areas of good productivity and adequate infrastructure far from the forest frontier—have proven effective. Instruments that may be applied include disbursement through projects, or block payments to local governments implementing the programs.

The renewed emphasis by the Government of Indonesia and the World Bank on agricultural development as a cornerstone of economic development and poverty alleviation could make this a particularly attractive option if REDD payments were to supplement more traditional development funds.

Direct payments to individuals or village-level groups, modeled on the successful Kecamatan Development Program (KDP), could be used to reward specific, local efforts to reduce deforestation, perhaps through village projects such as in the KDP. Managing such payments directly from the national level entails high transaction costs both in managing payments and in monitoring many small-scale projects, though KDP shows it is possible.

Another option would be to make block payments to intermediary agencies, such as district-level Forest Management Units established under Government Regulation 6/2006 (*Kesatuan Pengelolaan Hutan*—KPH), for avoided deforestation in those districts. Further disbursement to local beneficiaries might be managed by the KPH or a parallel agency such as a district branch of a REDD Public Service Agency (*Badan Pelayaan Umum*, or BLU). Accredited private agents and NGOs interested in bundling REDD sellers for resale on the national or international market could also be linked into governance structures centered around a KPH.

Local government (*Kabupaten*) license and would therefore receive 100% of REDD credits on forest land zoned as HPK and in the process of conversion to non-forest use (*Areal Pengunaan Lain*, or

APL).Thus, if a proportion of the APL were not deforested but retained under local government jurisdiction, REDD payments would compensate for forgone non-forest use.

Local government (*Kabupaten*) also license Payments for Environmental Services (PES) under PP6/2007 Protection Forest (HL), Protection Forest cannot be converted or exploited and remains a part of the national forest estate. REDD payments could thus be bundled with other PES payments collected by local government and redistributed to licensed concession-holders (including community-based groups) who directly manage the environmental services. MoFr might collect a portion of REDD payments for costs of monitoring, for example.

Forest concessionaires are licensed by the national government and administered by local government. Concessionaires would therefore be eligible to receive a substantial portion of REDD payments where the management reduced deforestation and degradation and so fostered the perpetuation of the forests beyond their concession periods. The balance would be shared among central and local government. Concessionaires are usually companies but cooperatives, community-based organizations, and even individuals can also hold forest exploitation rights. (Concessionaires can be community-based groups at least for forest protection and rehabilitation).

MoFr would receive the REDD payments in Protected Areas and a share of payments in PA buffer zones. Co-management services can be licensed by MoFr to local partners engaged in co-management schemes, including community-based groups and private firms, which would then receive REDD payments under the auspices of the PA management authority.

Under PP3/2008, Forest Management Units (KPH) will be able to issue licenses, bundle services of REDD sellers, receive REDD payments, and distribute them to service-providers in mixed or multifunctional landscapes comprised of different forest types.

3.5.2 The Situation in Indonesia

3.5.2.1 What is the existing experience with regulatory, fund and market-based approaches in Indonesia?

There are a number of initiatives presently operating in Indonesia with the objective of transferring funds from a source to beneficiaries in order to reward actions equitably and reinforce local responsibility for resource management. One system which appears to be working well is the disbursement of block grants directly to villages under the World Bank supported Kecamatan Development Programme[39]. A second system for which there is now accumulating experience with funding transfers as *Payments for Environmental Services*[40], has been developed under the regional ICRAF initiative known as RUPES (Rewarding Upland Poor for Environmental Services). Each of these projects offer valuable insights into the sort of architecture which would benefit a PDM for REDD carbon trading.

The Kecamatan Development Programme is in its third phase and has been reviewed with the view that it will be further scaled up. Operating as loan project to the national government through the Ministry for Home Affairs, it has sought to promote local responsibility for improvements in the

[39] The World Bank. 2008. National Program for Community Empowerment in Rural Areas. Project Appraisal Document, Report No. 42409-ID

[40] Agung, F., A.Suwarno,Purwanto, R.Hakim 2007. Making policies work for Payments for Environmental Services, PES: an evaluation of the experience of formulating conservation policies in Districts of Indonesia. Unpublished Power Point Presentation, CIFOR and WWF Indonesia.

environment and infrastructure of villages, which have been chosen on a range of criteria including their ranking on a national poverty scale. Although administered nationally, the approach which has been taken in the KDP has been to establish a direct means of disbursing funds in block grants to villages, in order to minimize the leakage of resources among various government and non-government players. The size of the grant is determined by a number of considerations, including the program of activities which are designed through facilitated meetings at the village and Kecamatan level, and the capacity of the community and the local government to manage the funds and to supervise and monitor their use. The block grants are disbursed from a Special Account through a Government Operational Bank to collective community bank accounts via an independent transfer bank. In this way the purpose of the transfers can be specified and they do not need to enter the inter-governmental financial transfer system structural issues relating to government fund transfers.

Despite the successes that have been achieved on the ground there remain a number of perceived risks that the sources of the funds need to consider. These risks include:

- The limited capacity of village communities to use and account for funds;
- The limited capacity of local government staff to supervise and monitor the activities;
- The uneven capacity of field consultants (facilitators) to assist communities in financial matters
- Weaknesses in the financial management capacity of the Project Management Unit.

These are all generically important issues that it can be expected will apply to local organisations involved in implementing REDD projects. The experience from the KDP is that with knowledge it is possible to establish the technical supports and infrastructure to find solutions, and that societal capacity will evolve over time. REDD as a funding source then thus become a continuing financial facilitator of social change.

The experience of the KDP has also revealed deficiencies in government in public financial management (PFM). These include:

- An inefficient budget formulation process;
- Fragmented cash management and government banking arrangements;
- Unreliable accounting and reporting systems;
- Unclear roles and responsibilities in external and internal audit arrangements;
- A lack of capacity in audit institutions;
- Poor salary and incentive structures and a lack of sanctions in civil service; and
- External audits are not risk-based and do not focus on systemic issues.

Many of these issues are acknowledged by government which has already taken a number of steps to address them. These include a new state Finances Law, a new Audit Law, a review of government accounting standards and the implementation of improved budgeting processes. The timing of these reforms are very pertinent as Indonesia begins to consider its operational options for implementing a REDD Carbon Trading Scheme.

The implementation of the concept of Payments for Environmental Services are also very pertinent to a PDM for REDD, which is itself concerned with the environmental service of retaining sequestered carbon in forests. A recent workshop on PES included 25 partner organisations assisting local governments in PES for water supply. These partners included ICRAF, WWF, LATIN and CARE and extended across the country from Sumatra and Java to Kalimantan, NTB and NTT. Three of the case studies reviewed by the CIFOR-WWF team are concerned with the conservation of the water regulating function of retained forests: Mt Rinjani in Lombok; Sungei Wain Protection Forest in

Balikpapan and Kuningan in West Java. Malinau in East Kalimantan and Kapuas Hulu in West Kalimantan are also concerned with payments for water but have added significance because of their importance for conservation of regional biodiversity. A summary of several PES systems is provided in Table 15. An interesting complementary concept which has been developed is the notion of a local government seeking designation as a *conservation district* as a means of attracting investment by *green* investors in the conservation resources of the region. While the concept does not have official national acceptance it has been adopted by several local governments including the Kabupaten of Kapuas Hulu in Kalimantan and also the Kabupaten of Belu in West Timur. In both these locations substantial APPD (budget) allocations have been identified for environmental management in support of sustainable water supply.

The conclusions drawn from these case studies indicate that to encourage forest conservation efforts among civil society players there is a need for regulatory as well as market based incentives. Policy interventions at the national and local government levels are required which will facilitate buyer interest in the payment of environmental services and further incentives, perhaps with sanctions to ensure that conservation efforts are implemented sustainably by the ES providers. Finally the systems of payment distribution that are the shortest and simplest are the best.

Table 15. A comparison of the operation of selected PES projects involving transfer of payments between levels of government and implementing agencies

Location	Environmental Service	Management focus	Provider	Buyer	System	Effectiveness
Lombok	Water supply	Forest; springs	Private property owners	PDAM clients and the bottled water industry	Established under a local PERDA, the provision of the ES is overseen by District Government and the independent third party community group Bestari Rinjani Konsepsi	95% of respondents to a willingness to pay survey indicated their support for a levy in support of upstream land management to improve the sustainability of water supply.
Sungei Wain Protection Forest (HLSW)	Water supply	Reservoir, forest	Balikpapan City Govt; local NGO's; local commmunities	PERTAMINA	Direct payment from Pertamina to City Government based on a levy on water supplied; forest management managed by City Government forest Management Agency (BP-HLSW)	Previously operated under national legislation involving payment of royalties to the national government and then devolvement through APBN, APBD and local budget reserved allocation. The system broke down because of conflicting national legislation forcing simplification to a minimum no. of transactions.
Kab. Kapuas Hulu	Water supply (and biodiver-sity)	Watershed	District Government	PDAM and Local Government with National/ Inter-national interest because of conservation values	Conservation District concept identifies regions where a land use focus on biodiversity conservation requires alternative sources of funding to compensate limited options for more market based resource industries. The implementation of the concept is being overseen by a National Conservation District Task Force (NCDT) which would guarantee the provision of the Biodiversity ES from these two locations	Three NP's cover over 50% of the region of Kapuas Hulu and Malinau Districts are all bringing in international support and interest in outcomes because of the "heart of Borneo" programme. Local government has allocated Rp 400 million from APPD for conservation and environmental management. By adopting the concept of a "Conservation District" the Local government is seeking to attract green investors. The effectiveness of this concept has yet to be assessed.
Kuningan	Water supply	Watershed	Kuningan District Government, LATIN	PDAM Cirebon City Government	Provincial Government and NCDT; formal arrangement and financial levies are under negotiation	Example of a conservation District approach to water supply

3.5.2..2 What are the design requirements for a National REDD payments system for Indonesia?

Because REDD is vulnerable to broad or systemic governance problems, efforts to improve forest governance with increased transparency and accountability need to reach the broadest possible constituency of stakeholders, and these stakeholders need to be informed, motivated, and empowered to take appropriate action. In other words, if REDD remains an obscure and little-appreciated environmental program that is not perceived by most people as one that affects their lives and livelihoods, then they are unlikely to care about it or engage in the kind of broad-based collective action needed to overcome systemic governance problems. Thus, a narrowly focused REDD program that targets special interests rather than a broad constituency is more likely to fail.

This implies that REDD should be designed to distribute benefits widely so as to offer incentives to a broad group of stakeholders who will demand accountability and improved performance from forest management authorities, local government, and other relevant agencies. One option for building such "REDD constituencies" is through investment in forest-based environmental services, especially water and watersheds, that benefit potentially large numbers of people and engage multiple levels of communities and agencies in co-management to reduce deforestation. Another is to channel REDD payments to poverty-reduction programs that benefit the general public, such as health, education, agricultural development, and land-tenure reform, which may or may not directly contribute to reducing deforestation but will reinforce the perception of REDD's value. There are potential roles in such schemes for many sectors and levels of government to receive and manage REDD funds in return for tangible improvements in governance and service delivery that contribute directly or indirectly to avoided deforestation.

Designing an Indonesian national REDD payments system will involve decisions over:

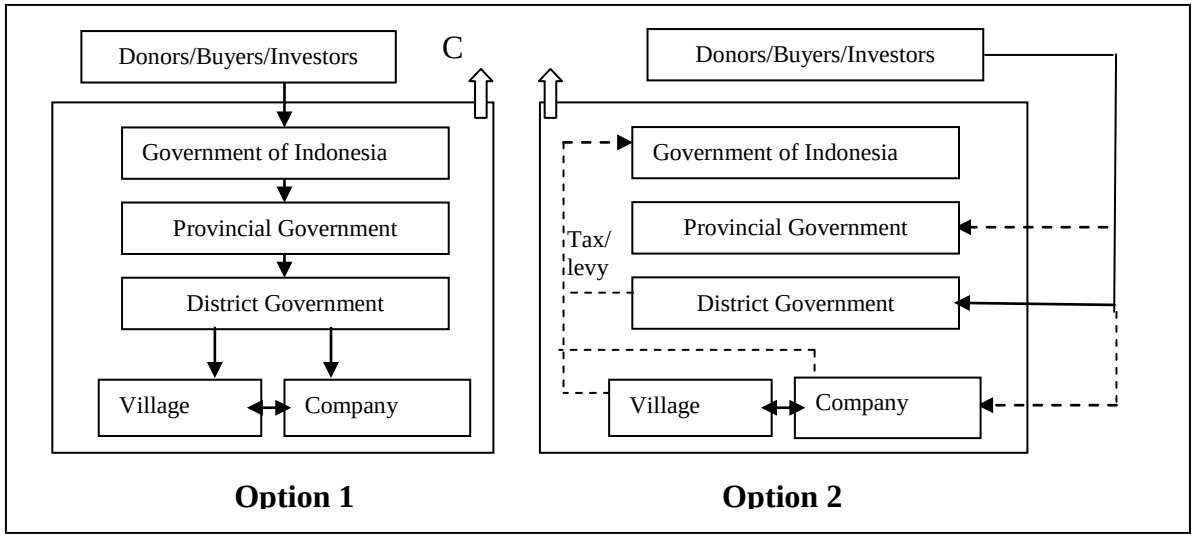
- Financial transfer mechanisms at different scales;
- Revenue allocation;
- Forms of payment and timing;
- Legal and other institutional structures; and
- Risk management options.
- Transfer mechanisms

The first issue is where primary transactions with international buyers or fund providers take place. There are two options:

- Transaction with the central government; and
- Transaction with lower government levels or directly with projects (Figure 19) in accordance with the relative share of the location in the national baseline.

Each option leads to a different form of redistribution mechanism. Option 1 is centralized and government funds would need to be redistributed from a central fund held at national level. Option 2 is more decentralized, but a tax or levy placed on REDD activities at sub-national level would need to be collected to pay for national administrative functions, such as monitoring and accounting. Funding mechanisms would still be required in this option in order to redistribute revenues accrued through the tax or levy.

Figure 19: Possible REDD Transfer mechanisms and configurations with buyers/donors/investors :



Redistribution of funds from central government can take three main routes:

1. *Following the government administration hierarchy***:** National <> Provincial <> District government <> Village
2. *Based on management of forest functions***:** National <> National forestry authority <> Local forest management units
3. *Domestic project-based with the nation as re-seller on the international market:* National authority <> Project entities <> local actors

Regardless of the route, funds could be transferred through the state budget allocations, or through an independent financial system. The advantages of integrating funds into the state budget include:

- the possibility for more effective monitoring by the government and parliament;
- more systematic financial management at national level;
- the application of the existing performance-related budgeting system, which would allow target-setting for REDD; and
- contributions to government revenues depending on the form of contract with international buyers or donors.

The disadvantages include:

- possible delays in disbursement of funds;
- changes to the legal system in relation to central and regional financial management; and
- the possibility of rent seeking at different government levels.

An independent REDD funding system could avoid some of these disadvantages; but it would also have to be closely linked to government institutions.

Further redistribution of funding might be needed. For example, if the *Kabupaten* has a baseline, and receives REDD funding in proportion to how well it performs against this baseline; it might need to redistribute funding at the sub-Kabupaten level. The mechanisms used would vary with the type of

stakeholders involved, the type of land use and whether deforestation was planned or unplanned, but should be openly negotiated to avoid excessive influence by any given interest group.

In cases where a concession license has been granted, the license would need to be revoked or reclassified. In this case, it is likely that a significant portion of funds might be needed to compensate the concession license-holder; or to provide an incentive for alternative activities such as sustainable forest management. In cases where a concession license has not been granted, and in the case of avoided emissions from unplanned deforestation/degradation, there would be no concession licensee to compensate. Therefore benefits could flow directly from Provincial or District Government to the village(s).

Financial transparency will be maximized if REDD transactions occur as close as possible to the stakeholders that are taking the measures to reduce deforestation and degradation. The benefit flows; responsibilities of different parties; liabilities, and carbon accounting configurations will be different depending on which transaction options and redistribution options are chosen.

Revenue Allocation of REDD payments has horizontal and vertical dimensions. The horizontal dimension relates to the distribution of revenues among stakeholders at a particular scale, for example between the islands of Indonesia or between different stakeholders in a REDD project. The vertical dimension relates to allocation between different administrative levels, for example between national, provincial and district governments.

The question of allocation within each of these dimensions is linked to who should be the legitimate recipients of REDD revenues. The criteria for establishing who is a legitimate recipient are those that:

- Change their behavior and reduce emission rates in the long term
- Suffer legitimate losses from mandated REDD implementation
- Maintain low carbon emissions rates (continued conservation)
- Provide sustainable low C emission alternative livelihoods
- Act legally and have rights to sell carbon (provided this does not disadvantage the poor and those with customary rights not recognized by government)
- Exhibit high accountability, transparency and good governance
- Have included provisions for capacity building
- Include elements of long term learning

Competitive bidding processes are a possible way of deciding horizontal allocation. Precautions may need to be taken to ensure that this is not violated and does not discriminate against local communities who lack experience framing such proposals. In practice in Indonesia it may be an option to provide some level of initial funding to all regions and stakeholders in order for them to develop REDD systems, before introducing conditional and competitive processes that might otherwise discriminate against marginalized groups.

One of the major problems Indonesia will face in allocating REDD revenues will be to provide adequate incentives to areas with high rates of deforestation to reduce emission rates, while also providing an incentive to those with low emission rates (i.e., an *efficiency* versus *fairness* tradeoff).

This is a problem that has also emerged among developing countries at the international level, and the same problem arises between different areas of Indonesia (e.g. different islands). One possible solution to this problem is to create a *stabilization fund* for areas with low rates of emissions, stocked through a

tax placed on the REDD market system, driven by a search for *efficiency*, and thus attractive to the most negative baselines.

As use of forest resources usually requires more than one type of permit, revoking forest use concessions may lead to claims for compensation. Land ownership does not necessarily coincide with the right to change the vegetation and hence terrestrial carbon stock. Separate regulation of *rights to sell* carbon storage and/or other environmental service (ES) is feasible[41], but in implementation the various claims on land ownership need to be taken into account.

These issues are further complicated by definitions of *forest*. *Forests* without trees as well as *non-forest* lands with full canopy cover of trees may exist side-by-side. For REDD to work, payment systems must be able to transcend these differences and address changes in carbon stocks. Local government entities (e.g. at Kabupaten (district) scale), may be appropriate scale for assessing net changes in terrestrial carbon stocks, regardless of the institutional control over the lands and vegetation (Box 2). Current 'decentralization' laws[42] specify the primary responsibility for maintenance of 'protective'' land cover through forests at the Kabupaten level, while timber exploitation rights are decided nationally. It would be advantageous to Indonesia to reconcile these different domains of decision-making, by more closely specifying responsibilities at each level of government.

Box 2: KPH or District as a REDD unit of payment distribution?

Government Regulation PP 6, 2007 (PP=Peraturan Pemerintah) clearly established the 'Integrated Forest Management unit' or Kesatuan Pengelolaan Hutan (KPH) as the management entity for the government defined forest area (kawasan hutan) at different levels (district and province) and across forest functions (production, protection and conservation). Meanwhile, the district (kabupaten) is the key government administration entity at local level. REDD payment distribution mechanisms need to consider both district and KPH's as entities involved in generating and selling carbon credits, either in mechanisms that distribute revenues from higher government layers or in schemes where international buyers transact directly with these entities.

There are advantages and disadvantages of using either KPH or district as the primary REDD unit in a payment mechanism. The advantages of using KPH are (a) KPH tend to use natural boundaries in the landscape; (b) KPH 's can coordinate inter-district interests; (c) KPH 's integrates different forest functions. Meanwhile, the disadvantages are (a) it does not have a mandate for forests outside the *kawasan hutan;* (b) it may not have much influence on important drivers and actors of deforestation; (c) investment in sustainable alternative livelihoods may well require locations and activities under district control outside of the KPH mandate. In a mixed model, the KPH can coordinate all activities within the kawasan hutan to reduce emission from deforestation and degradation, while the district authority is responsible outside the *kawasan hutan* for transitions to sustainability. Both should be tested in pilot schemes.

Vertical allocation depends on where value addition occurs in the REDD *supply chain* and the opportunity costs occurring at each level. For example, in a national system it can be assumed that the Indonesian government will bear the costs of establishing the national system, national scale

[41] See for example the full list of Australian legislation, including carbon rights legislation, can be accessed at: http://www.austlii.edu.au/

[42] Government Regulation No. 28/2007, and Law No. 32/2004 and 33/2004

monitoring and verification, implementation of national policy reforms and national level administration of the system, as well as opportunity costs related to lost tax revenue.

These allocation criteria will be vital for the central government, regardless of how transactions take place between international and national levels. In a national system the central government could be liable for insuring emission reductions below the national reference scenario, but sub-national entities may only be liable for delivering emissions reductions within the boundaries of their project area. It is therefore possible that sub-national actors would prioritize efficiency criteria, over criteria that might result in long-term reductions in deforestation and degradation across the nation. Without appropriate safeguards governing the establishment of projects, this could put the central government at a disadvantage.

Steps that are needed in the supply chain for producing credible REDD credits across the scales (Figure 20) include:

1. *Local scale(forest management unit, district, province)*
    - Direct action to reduce current emissions (short term impacts)
    - Structural changes in the local economy that reduce dependence on activities that cause emissions (longer term)
    - Prevention of 'leakage'
    - Proof of additionality against a locally relevant 'business as usual' baseline
2. *National scale*
    - Dealing with *permanence* concerns
    - Accountability for changes in C stocks
3. *National/international scale*
    - Independent verification of emission reduction

To make the system work, the interactions across the horizontal scales, the vertical scales and temporal scales, all need to be addressed.

Form of payment and timing (payment schedule and provision of upfront financing) is a critical factor because for every moment a forest is conserved, the opportunity exists for it to be deforested. To ensure permanence, implementation of REDD implies that a theoretically infinite series of foregone opportunities should be compensated. How can this be managed?

There are two main payment schedules that could occur under REDD:

- A lump sum upfront payment would involve transferral of the agreed amount of funding all at once. This would need to fund forest protection perpetually (in practice a minimum of 100 years). This approach would favor current beneficiaries but it could severely restrict land use options for future generations, and a demand for compensation would be expected. Weak or biased enforcement would also undermine ability to translate agreement into reality.

- The alternative is to distribute payments over time. Although current beneficiaries might gain less, a staged payment schedule provides incentive for long term carbon storage, and is more likely to address the permanence issue. The main challenge will be to secure long term financing for such staged payments.

Payments could be made to individuals or to groups. If all stakeholders are identified, individual payments matching their opportunity costs are likely to be most effective. There is also less likelihood of *elite capture* if individuals are able to assert their rights to payment.

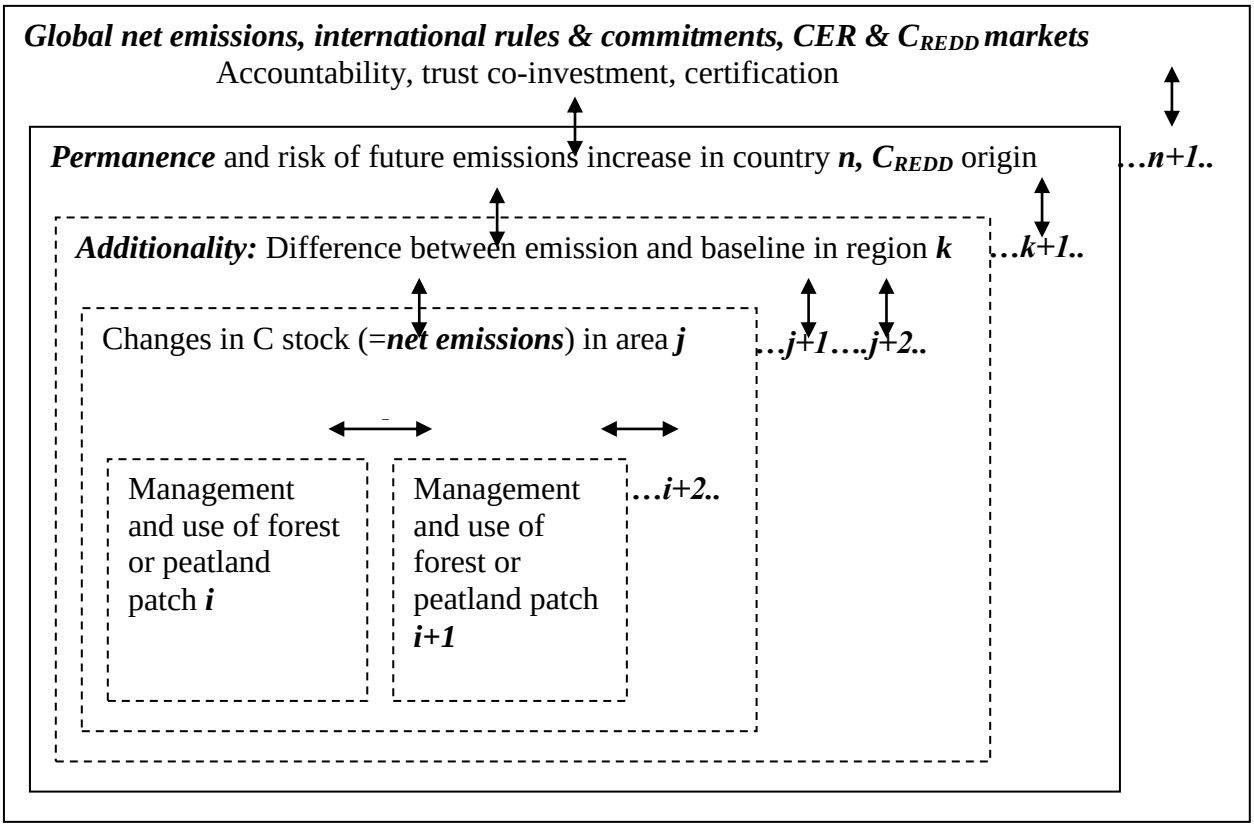


Figure 20: Value additions in the REDD Supply Chain

However, the transaction costs of dealing with large numbers of individual contracts gives rise to a trade-off. Payments to groups might involve lower transaction costs for those making the payments, but mechanisms for equitable decision-making on rules and procedures for benefits sharing within the group are likely to be required.

Payments for REDD can be made as cash and non-cash transactions. For cash transactions, international buyers could pay in cash to the sellers (government, community or company) through bank transfer based on agreed terms. The sellers may then redistribute the cash to those who participate in REDD supply chains. The community-company partnership scheme provides an example of this cash payment.

For non-cash transactions, funding from international to national levels could be delivered through conditional *Debt for Nature Swaps* (DNS), although this would be unlikely in a market-based system unless accompanied by systems for carbon accounting. The approach also carries the risk of infringing upon community rights through excessive state control over forest access.

Because access to and use rights of forest lands remain a major stumbling block for sustainable rural development, conditional use rights within a 'community based forest management' (HKM) or

'village forest' (*Hutan Desa*) framework may be more effective than financial transfers in reducing emissions[43]. Negotiation would be required on a case by case basis to determine the most appropriate form of benefit to the local actors.

Legal and other institutional frameworks. Existing legal frameworks will influence both fund-based and market-based approaches to REDD, particularly where financing is incorporated into the state budget. Revenue Sharing Funds (DBH), General Allocation Funds (DAP), and Special Allocation Funds (DAK), describe revenue sharing between national and sub-national government entities and will play a role in allocation decisions for REDD. Laws describing decentralization of roles and authorities of forest governance will also have a major influence in the design of REDD. Present legislation is not sufficiently clear in the allocation of authorities and this is an issue in relation to

- the level at which responsibility lies in implementing REDD policies and measures on different land categories; and
- who is liable in case of failure.

Clarification of the legal instruments will need to consider payment systems.

Existing institutions will need strengthening and new institutions will need to be created for REDD. These will include

- Fund managers for receiving and redistributing funds;
- Registries for tracking emissions reductions credits;
- Legal institutions for adjusting existing laws, enforcing REDD related laws and resolving disputes;
- Monitoring and verification entities for ensuring that emissions reductions are real and achieved in environmentally and socially acceptable ways;
- Implementing and administrative organizations for handling contracts and logistics; and the sellers of carbon themselves who may need to organize internal redistribution mechanisms.

A summary of potential institutional roles and responsibilities is provided in Table 16

The main differences in institutional responsibility between the different REDD scenarios relate to the role of the national government, which could act as:

- A seller of carbon to international buyers,
- A buyer of carbon from sub-national entities,
- An intermediary and a regulator of the system.

It is assumed that in a national REDD system the government will play a role in monitoring, accounting for emissions reductions and technical support.

Therefore in terms of transparency and accountability it may be advantageous to Indonesia if the national government is not involved in financial transactions as a buyer or seller. To guarantee fairness, clear mechanisms for checks and balances from independent third parties will be required, whichever institutions are involved.

[43] Lipper and Cavatassi (2004)

Risk management plays an important role in investor decisions about transactions. Experience with existing carbon markets indicate the different forms of and highlight the key issue that risk reduction is for REDD in Indonesia. Some of the most important types of risk include:

- Governance risks (e.g. low transparency, accountability and high corruption, or the risk that the national government reverses policies related to REDD);
- Permanence and leakage risks at national and project level; and
- Project risks, especially those related to land ownership and conflict

Table 16: Potential institutional roles and responsibilities for REDD in Indonesia

Entity and example institution in Indonesia	**Role and responsibility**
National/Regional/Local fund managers (e.g. BLU)	• provide upfront financing to invest in REDD activities, • receive money from the (future) sale of verified emission reductions, • redistribute payments to actors that reduce emissions from deforestation and degradation, and • market 'Green Indonesia REDD credits' to international buyers.
National/regional/local registries (e.g. BPN, BAPLAN)	• record how many REDD credits have been created and provide publicly verifiable information on spatially explicit REDD performance (to avoid double accounting, address permanence concerns), • track movements of carbon between actors.
Monitoring entities, linking local to national scale (e.g. BPS, civil society, contracted service providers)	• quantify C stocks and emissions, • calculate emission reduction relative to a baseline or target, • ensure payments made by national fund manager go to the actors that have really reduced emissions, • assure buyers that there have been no negative social or environmental impacts resulting from the REDD strategy, or that these have been adequately compensated for through mutual agreement.
National/regional/local legal institutions (Legislative, DepHut, BPN)	• develop regulations to facilitate REDD mechanisms and transitions to sustainability (e.g., by securing forest carbon rights), • adjust existing forestry laws and property laws if necessary (e.g., to recognize customary or informal rights governing current use, so that the poor do not become marginalized through REDD), • help enforce laws relating to the REDD system, • help resolve disputes between actors and help in ensuring equitable access by actors to REDD funds.
Emission reduction agents and providers of alternative livelihoods	• community-scale agents and companies need to establish processes for redistributing financial benefits from REDD to local stakeholders and provide accountability for outcomes.
Auditing (e.g. BPK, KPK and PPATK) and verification entities, with international credibility	• ensure the money is distributed and governed according to agreements and that cases of corruption – and weaknesses in the system allowing corruption – are duly reported, • provide independent oversight over the entire REDD system.

The reduction of governance risks require improved performance across a wide range of indicators and can be difficult to achieve. Financial reporting, auditing procedures and transparency policies will need to be reviewed to ensure they can deliver payments to legitimate recipients. The *Badan Layanan Umum* (BLU)[44] could be an option for national and local levels. The supreme auditor, financial intelligence unit, the Anti Corruption Unit and NGOs such as Indonesian Corruption Watch should also be involved with REDD in order to reinforce international and national understanding of the quality of governance to which Indonesia is prepared to guarantee. Village bank accounts, local credit unions and countersigning processes governing withdrawal of funds can be used at the village level to ensure that funds reach legitimate recipients. Collaborative learning could also help improve REDD implementation over time, as has been the case with GERHAN in some locations.

The risk of *non-permanence* at national and project levels can be reduced by

- the use of a national baseline,
- reporting systems, registries tracking credits from particular geographic areas,
- the use of insurance 'buffer'; and
- devolution of liability to project level.

At the project level the risk can be mitigated by the use of long project lifetimes with strong contracts and liabilities. Shortcomings in law enforcement, future pressure on forests for meeting local livelihood needs and limited ability to repay may undermine the potential of using long nominal or perpetual operational lifetimes in the Indonesian context.

The implication is that REDD incentives will need to be maintained over long time periods, and possibly for the complete duration of the nominal period to maximize their value to buyers who have shown little interest in temporary crediting systems, such as A/R CDM.

Ensuring accountability and transparency in the Indonesian REDD system will be essential in order to secure investments from external buyers or fund providers. This may be achieved by tracking emissions reductions ***up*** the supply chain, and financial transactions ***down*** the supply chain. In practice this will mean establishing systems for monitoring, reporting and third party verification of emissions.

Third party verification of carbon accounting systems at both national and project level will be required in order to increase accountability and reduce risk. Standard verification processes and accredited organizations for carrying out verification already exist and could be used in an Indonesian REDD system. Voluntary standards to increase project quality, especially in relation to social and environmental impacts (such as the Climate, Community and Biodiversity standard), could be used for REDD and could even be made mandatory by government[45].

Project risks relating to land ownership and conflict can be reduced through the use of tools such as Rapid Tenure Assessment (RaTA), spatial planning (Rencana Tata Ruang) and gazettal[46]. Indonesian forestry law includes an option for regulating *community based forest management* in either production (HP) or protection (HL) forest, as a form of management contract between the forest authorities and farmer groups. Recent changes to the implementation rules imply that farmer groups no longer need to formally form a *cooperative* before they can be recognized in such agreements.

[44] GR 23/2005 (PP N0.23/2005) on Public Service Bodies
[45] Peskett et al. 2007.
[46] Sirait 2007; Galudra et al., 2007

Another new development potentially supportive of REDD in Indonesia is the option of Village Forest (*Hutan Desa*), as regulated in PP 6/2007 This policy can also be applied in Production Forest or Protection Forest. The concept recognizes existing village authorities as the contract partners. In December 2007 it is expected that Indonesia will announce the allocation of over 2 million hectares for Community Forests (*Hutan Kemasyarakatan* – HTM). Both HKM and *Hutan Desa*, may be used for local REDD implementation, providing there is clarity on local use rights, with conditionality attached in terms of carbon stock conservation. This application of REDD may be a real economic incentive for local communities.

Risk reduction for REDD involves a trade-off between complexity and accountability; and equity of access to benefits. Accountable systems can entail high transaction costs and the ability to understand complex technical procedures. These practical considerations may require clarification and training to ensure that the facility is widely appreciated and available[47]. For the same reason transaction costs need to be minimized by varying the methodological requirements for different actors (e.g. having lower requirements for communities that lack technical expertise and capital), bundling groups of projects together and negotiating agreements with buyers for them to cover costs in exchange for lower prices.

3.5.3 Challenges to achieving readiness

Designing a national REDD payments system in Indonesia that is effective at reducing long term emissions, is challenging. An appropriate balance must be found between efficiency and equity, embedded within a system that is accountable and transparent, shifts patterns of natural resource use towards long term sustainability, and improves the ability of stakeholders to engage with the system.

An Indonesian REDD payments system could take many forms depending on how transactions occur from international to national levels and the benefits are redistributed within the country. Transactions closer to beneficiaries are preferable in terms of efficiency, reducing corruption and rent seeking, reducing transaction costs and increasing investor confidence. If REDD revenues are accrued at a national level, either the state budget or an independent distribution mechanism could be used to transfer revenues to lower administrative levels. At more localised scales different REDD payment options can be used depending on the policies and measures to be put in place, the stakeholders involved and whether deforestation is planned or unplanned. They can also be targeted at a broad range of stakeholders or directly at individuals; and in either cash or non-cash form. Payments may be made up-front or disbursed over time. Up-front payments are generally preferable for the seller, but to encourage compliance and increase permanence, disbursed payments over a number of years might be preferable for the buyer. Which options are most appropriate is likely to vary between different areas and with different stakeholders.

The allocation of REDD funds has both horizontal and vertical dimensions, both of which depend on being able to identify who the *legitimate* receivers of REDD financing. Competitive bidding encourages participation and improves performance. In the horizontal dimension trade-offs between efficiency and fairness will need to be addressed through redistributing funds from areas with high deforestation rates to those with low rates. Identifying legal stakeholders will also be an issue, given the existing lack of clarity over land ownership in many areas. In the vertical dimension, the distribution of funds should relate to the *added value* each level offers to the production of the carbon commodity. Legal frameworks for payment distribution mechanisms will have to take into account existing legislation related to fiscal balancing between central government and the regions.

[47] Cacho 2006.

Existing institutions may need strengthening and new institutions established for REDD. Central government will play an important role in the REDD system and could simultaneously act as seller, buyer, intermediary and regulator of the system. Separating regulatory functions from fund management and trading roles will increase perceptions of accountability to the benefit of Indonesia. It may also increase efficiency if the central government adopts a role as regulator of the system, with transactions happening between district government and buyers directly, rather than using a highly centralized system. Use of safeguards to ensure transparency and accountability, such as the BLU will be crucial for strengthening financial processes.

REDD mechanisms are likely to entail high risks, which will have to be well managed in order to attract investors. *Permanence* is one of the key risks, more easily managed in a national accounting system. The REDD accounting system may need to consider financial *buffers* as insurance against project failure. The accounting system should include mechanisms for devolving liabilities down the REDD supply chain in a way that safeguards the interests of those less able to meet those liabilities. Third party verification processes, voluntary standards and tools for addressing land conflict in the negotiation of contracts are required, and could be stipulated by the central government. A balance is required between the quality of the REDD system, as this reflects in the quality of the tradable credits; and its accessibility to a wide variety of stakeholders.

4. REDUCING DEFORESTATION AND FOREST DEGRADATION

4.1 Future Directions in Forest Management in Indonesia

The Ministry of Forestry has been aware for a long time that rates of exploitation, and lack of attention to post logging land management, were not sustainable and that there would need to be a significant change in the strategic direction of commercial forestry from primary reliance on native forests to industrial plantation timber. As long ago as 1994, the Ministry's Forest Sector Review, implemented with support from the ADB, provided analyses indicating major production declines from native forests within 10 years. In 1998 the Minister of Forestry : Nasution began a process which reduced the level of commercial exploitation by rescinding almost 250 concessions that were considered to be non-performing in terms of their contracts. At this stage no one predicted the high level of illegal encroachment and illegal poaching of timber that would come following the Monetary Crisis, the end of the *New Order* Government and the subsequent impact of government decentralization in 2001. Minister Prakosa also endeavoured to reduce the level of exploitation of forests by seeking a *soft landing* by encouraging the decoupling of forest income from national economic drivers.

In 2003, forestry commodity exports from Indonesia accounted for US$6 Billion: 13.7% of the total non-oil and gas exports. Data provided in support of the Long Term Development Plan (see Figure 4 in that document) indicate a steep and steady decline in the contribution of forest product exports to GDP from 1997 to 2002 with a further precipitous decline in 2003.

The reduction in the area of good quality natural forest has been such that by the end of 2003 Indonesia contributed less than 10% of the global total and lagged behind the US, Brazil, Canada and Finland. In panel production Indonesia produced less than Malaysia and Korea and less than 2% of global pulp production.

In most of Sumatra and in many parts of Kalimantan, Sulawesi and Moluku, destructive forest practices have created circumstances where there is little opportunity for a timber industry based on native forest to continue. On the islands of Sumatra and Kalimantan frequent and prolonged fires have destroyed extensive areas of forest. In the low land peat soils the fires have created circumstances where natural regeneration is often impossible because salt water intrusion has led to invasion of *Nypa* palm and *Acrostichum* fern. On these islands the removal of the original vegetation has led to its replacement by tree crops, particularly oil palm. Extensive areas of land allocated for industrial tree plantations for pulp production have been left undeveloped and degraded. Encroachment and illegal logging by local communities have degraded extensive areas of production forest but also nature conservation areas and protection forest. BAPLAN estimates that by the end of 2004 59 million ha of the forest estate had been degraded. By 2004, 282 watersheds were considered to be in a critical condition with most degradation outside Java attributed to mismanagement of commercial forestry operations.

The consequence of these changes in the forest resource is that the future of commercial forestry will depend on an extensive expansion and investment in plantation forest species such as *Acacia* spp. and experimentation with a new range of high value and fast growing tropical hardwoods. The commercial exploitation of natural forests will need to be reduced and rationalized with a change in focus to high value-added products directed at new and selective markets. There needs to be a strong focus on identifying land with potential for industrial timber estates and for crops such as oil palm; and agreement between national and local governments about the need for forest vegetation retention based on an understanding of their functions in disturbed and changing landscapes, supporting

increasing numbers of people. More than ever before, the remaining forests of Indonesia need to be managed with a view to their importance in maintaining and improving the quality of life of rural communities and the poor. This objective will be assisted by a renewed effort to conserve the rich biodiversity of Indonesia's tropical forest, commercialization of its secondary forest products and the conservation of forest ecosystem processes which regulate clean water, regulate the distribution of nutrients across the landscape, conserve soil and provide the natural predators which contribute to agricultural productivity.

This vision of the future of Indonesian forestry is not new: much of it is embodied in the current Ministry of Forestry Long Term Development Plan; in the Road Map for the Revitalization of Indonesia's Forest Industry, and in the national RPJPN and the national 5 year plans. What is lacking is not the vision of the future; and not the clear goals and objectives; but a sequence of actions that can be budgeted and staffed and commenced today to ensure that the vision is achieved within its planned horizons, and does not remain merely a sad aspiration.

The Ministry has invested substantially in improved regulatory and enforcement actions that need to be taken in the field to reduce deforestation and degradation and these are also supported by national and international efforts through donor agencies. However, there are also fundamental systemic issues of institutional infrastructure and human resources capacity, which need to be improved to ensure that successes achieved in day-to-day management can be sustained. For example, It is necessary to know the status of the forest resource in actuality; and its potential, to continue to meet the functional purpose for which it was originally zoned. This uncertainty applies to Production Forest, to Convertible Production Forest and to the Protected Areas, all of which have suffered higher levels of encroachment and other illegal activities since 1997.

In order for this analysis to be achieved and interpreted in ways that feed back to better forest land management, it is important that there be a sufficient number of informed professional and para-professional staff. The figures describing the available human resources for the forestry sector that are contained in the Ministry's Long Term Development Plan underpin the challenge Indonesia faces in progressing towards its sustainable forest management goals. For example, of the estimated 71000 employees in the public and private forestry sector, over 58 000 have only high school training. Eight thousand have basic degrees, 750 have masters' degrees and 85 have doctorates. In the public sector 76% of the national and regional forestry staff have senior high school qualifications only. Because of staffing policies in the civil service generally, those with higher degrees are in positions which are essentially administrative, and many will be administering activities far from their personal areas of expertise. The task of researching and testing innovations and new ways of approaching forest management lies principally with the Forest Research and Development Agency who have a research staff of about 500,. Since 2001 decentralization has removed project budgets and opportunities for national staff to undertake professional development postings in the regions through the KANWIL structure. The removal of foreign funding from the Bogor Conservation School within the Ministry of Forestry after 1992 also removed a major source of in-service training where professional and para-professional staff could be exposed to international benchmarking. Foreign language publications by Forestry R&D are now more limited and this impedes networking with researchers at a global level.

The REDD mechanism has the potential to provide funding to address these fundamental issues of reform and growth in the forestry sector. It would put in place a framework for the explicit consideration of stored carbon as a natural resource of the same scale and importance as the timber which holds it. National and international carbon markets can lend a tradable value which offers real financial options to the way forest land might be managed. In some cases strictly avoiding deforestation will closely coincide with some stated government goals such as the preservation of biodiversity and the maintenance of pristine protected areas. In some other cases avoiding

deforestation may clash with competitive objectives such as the quest for immediate economic growth. In these cases of conflict, decision makers will need to evaluate whether the additional values generated by REDD payments would adequately compensate for the sacrifices implied in reducing deforestation. This would require a careful examination of the opportunity cost of avoiding deforestation in the different economic circumstances that may occur in Indonesia's forest resources.

4.2 Business-as-Usual deforestation and degradation estimates

4.2.1 Protected Areas

The business as usual (BAU) scenario projects average historical rates of forest loss and emissions for both conservation and protection forests. Three alternative baselines were evaluated:

- The low case uses the 5-year average emissions;
- A medium case was created that assumes that the emissions from 2004/5 will continue for the next five years.
- A high emissions scenario projects emissions to grow at 30% per year[48]

The impact of a REDD scenario assumes current forest loss is eliminated over a five year period (Table 17). Over the following ten years, a portion of the land is projected to be restored and then stabilized at a higher percent forest cover.

Based on the estimates from MODIS imagery, and assuming a 5 year time-frame for reducing forest losses to zero, the Base case (low case) estimate is that there is a potential to avoid emissions of approximately 10 million tonnes of CO_2 over a 5-year period from conservation forests, and 44 million tonnes over the same period from protection forests. This would represent a net gain of 9 million tonnes over the next 5 years, equivalent to $ 36 million of carbon credits[49]

4.2.2 Production forests

4.2.2.1 Natural forests.

The continuing loss of natural Production Forest over the next 25 years based on BAU projections depends on whether the figure are based on MODIS or Landsat data. As Table 18 illustrates a schedule of reduced carbon emissions from complete elimination of loss of production forests can be calculated against the above BAU scenario[50]. This gives the maximum possible gains to be made from REDD. A stream of carbon reduction benefits from doing this has been calculated for each scenario. Using a social discount rate of 10% per annum, the potential value of carbon credits is $US 11.67 billon using the 2000/1-2005/6 projection base, and $9.64 billion using the 1997/03 base.

Table 17. A comparison of between BAU projected losses of CO_2 from Conservation areas and Protected Forest and those which could be achieved through a REDD management focus.

Conservation forests

[48] This is conservative compared with the rate of growth of approximately 75% per year for the past four years.
[49] Assuming a base price of $4 per ton
[50] Assuming a base price of $4 per tonne and a carbon stocking rate of 200 tonne of carbon per ha. in primary forest and 150 tonne per ha in secondary forest. The detailed assumptions and parameter value calculations are shown in Annex 6 of the main report from this Study, and in a spreadsheet projection model developed for this purpose, posted on the Wiki site for information from the Indonesia Forest Climate Alliance. The main report and model show results for sensitivity testing on all the major variables used in these calculations

		2008	2009	2010	2011	2012	2013
BAU loss	ha	9,335	9,335	9,335	9,335	9,335	9,335
REDD loss	ha	9,335	7,468	5,601	3,734	1,867	-

Protection forests

			2008	2009	2010	2011	2012	2013
LOW	BAU loss	ha	16,161	16,161	16,161	16,161	16,161	16,161
	REDD loss	ha	16,161	12,929	9,697	6,464	3,232	-
MEDIUM	BAU loss	ha	39,995	39,995	39,995	39,995	39,995	39,995
	REDD loss	ha	39,995	31,996	23,997	15,998	7,999	-
HIGH	BAU loss	ha	39,995	51,994	67,592	87,869	114,230	148,499
	REDD loss	ha	39,995	31,996	23,997	15,998	7,999	-

Table 18: BAU production forest area projections 2005-2030, in millions ha

Basis for Calculation	2005	2010	2015	2020	2025	2030
MODIS: 2001/06	31.92	30.12	27.38	23.72	19.12	13.60
LANDSAT:1997/03	31.92	29.43	26.95	24.46	21.98	19.49

4.2.2.2 Industrial plantations and the pulp and paper industry.

Past clearing of native forests, driven by the demand for pulp, has mainly taken place in proximity to the large mills that have not established adequate areas of plantation sources. These mills have made use of available supplies of MTH within a commercial distance of their operations. There is a serious risk that future pressures on native forests will grow because of a newly booming export market for chip, and projected expansion in domestic markets to meet planned new pulp mills. This demand is likely to be directed to areas of Indonesia that still have large stocks of natural forest remaining, in particular in Kalimantan and Papua.

Based on analysis of land cover data, approximately 28% of land allocated for HTI is secondary forest, 2% is primary forest, and 35% is on peat (Table 19). Assuming a 7 year old *Acacia* plantation contains 53m^3 C per ha, on 65% of land allocated for HTI production, the establishment of plantations will result in net carbon losses. Another 26% of land that may be available for plantation development is classified as shrub and, depending on the biomass on these degraded lands, the net carbon loss of plantation establishment may be either negative or positive. Barren land and savanna, where the net carbon impacts of plantation development are likely to be positive make up 9% of the total.

In the medium term, capacity at existing pulp mills is projected to increase by around 1.4 million Mtpa). In the longer term, total national capacity may reach 10 million or even 15 million Mtpa. If the latter number is assumed, national pulp production at full capacity will require a total plantation base of approximately 3 million hectares: 1 million hectares more than the current planted area. A further 1 million hectares might be developed for exports of wood chips. Plantations yet to be established for solid wood products may occupy another 2 million hectares. Thus, the predicted total additional plantation area is around 4 million hectares.

If it is assumed that half of the additional HTI needed for national pulp production (500,000 hectares) is developed on non-forested peat, emissions from the first five years of this development will be 788

million tons of CO_2 (1,575 tonnes of CO_2 per hectare). Assuming the remaining pulpwood (1.5 million hectares) and solid wood plantations (2 million hectares) are established on degraded natural forest on mineral soils, with an average of 100 tons of carbon (367 tonnes CO_2), where net emissions will be around 300 tonnes of CO_2 per hectare, total net emissions from vegetation clearing will be about 1. 2 billion tonnes of CO_2: equivalent to a potential carbon value of US$ 4.8 billion.

4.2.3 Oil Palm

Indonesia's oil palm sector will likely continue with rapid growth. Some predictions are as high as 7-8 million ha by 2020[51], although 5-6 million ha by 2020 is regarded as more likely. These figures imply an annual rate of expansion of 4-500,000 ha of oil palm. This compares with an average of 3-400,000 ha of oil palm per year between 2000 and 2006. Most of this industry expansion is expected to occur in Sumatra first because this island has the best climate, soil conditions and infrastructure in the country for oil palm cultivation. However, growth will also increasingly occur in Kalimantan and Papua as suitable land for oil palm is becoming scarce in Sumatra.

The total amount of land already allocated for oil palm plantations in Kalimantan is almost enough to produce Indonesia's projected CPO production by 2020 (41 million tonnes of CPO). Accurate and up-to-date spatial data of issued location permits needs to be collected from provincial governments to determine how much land has already been allocated for oil palm developments throughout the entire archipelago.

[51] Bisinfocus 2006

Table 19: Land Cover of Areas Allocated to HTI 2003

Low C Lands:	Area (ha)	% of Available HTI
Savanna	36,710	1%
Shrub	1,139,778	26%
Barren Land	345,564	8%
Total Low C:	**1,522,052**	**34%**
Medium C Lands:	**Area (ha)**	**% of Available HTI**
Secondary Mangrove	16,476	0%
Secondary Dry Land Forest	1,212,874	27%
Total Medium C:	**1,229,350**	**28%**
High C Lands:	**Area (ha)**	**% of Available HTI**
Primary Mangrove	2,272	0%
Primary Dry Forest	104,521	2%
Total High C:	**106,794**	**2%**
Peat Lands:	**Area (ha)**	**% of Available HTI**
Swampy Shrub	428,496	10%
Swamp	69,529	2%
Primary Swamp Forest	29,945	1%
Secondary Swamp Forest	1,040,027	23%
Total Peat	**1,567,997**	**35%**
Lands with other land uses	**Area (ha)**	**Percent of Total HTI**
Dry Land Agriculture Mixed with Shrub	1,219,243	17%
Mining Area	18,821	0%
Fishpond	2,933	0%
Settlement	14,368	0%
Paddy Field	8,773	0%
Dry Land Agriculture	205,647	3%
Estate Crops	405,738	6%
Timber Estate	902,581	12%
Transmigration Area	7,894	0%
Total Unavailable	**2,785,998**	**39%**

Source: Data provided by Ministry of Forestry, 2007

4.3 The Drivers of Deforestation and Forest Degradation

The national forest estate has provided Indonesia with a major source of its non-oil and gas foreign exchange since the 1970's and will continue to do so as national policies promote the expansion of timber plantations for wood pulp for paper and other fibre products and for solid wood. In addition, convertible production forest will continue to be used for estate crops and for agriculture and settlement at an increasing rate as local governments strive for economic independence and strategic products like palm oil and biofuels increase in importance. As Indonesia's population continues to grow through the current long term plan projections towards 275 million, there is also going to be continuing pressure for land reform and reallocation of forest estate to support the growing numbers of people.

Each of these uses and projected uses, constitute controlled changes to the forest estate that can be ***planned***. They therefore represent projected changes in forest cover that can be accommodated in the national baseline for future carbon credits through avoided deforestation and degradation (REDD).

In addition to these losses, the largest length of the boundaries of the production forests and the protected areas are more difficult to control and are therefore open to ***unplanned*** encroachment from communities of local people or other commercial forest users, and subject to small and large scale illegal logging.

Planned (controlled) and unplanned (uncontrolled) losses from the forest estate require different management approaches, and often different agencies for enforcement. Table 20 sets out a decision framework which accommodates this reality across the major forest land use types.

4.3.1 Planned forest losses

Industrial tree plantations will expand significantly over the next years. As the availability of timber from natural forests is declining, pulp producers, plywood producers, and furniture manufacturers are increasingly turning to fast growing tree species, grown in plantations, as a source of raw material. National pulp production capacity will continue to expand, requiring an increase in plantation area. Over recent years, there has also been a growth in chipping mills that produce pulpwood chips for export, creating further demand for plantations.

4.3.1.1 Forest plantations and the pulp and paper industry.

The Ministry of Forestry (MOF) has allocated over 10 million hectares for industrial plantation (HTI) concessions. In addition, MOF has plans to establish another 5.4 million hectares of community based timber plantations (HTR) up to 2016. This land, within the Production Forest zone contains forest vegetation which varies from primary forest to heavily degraded forest and is located on mineral as well as peat soils.

The largest portion of Indonesia's commercial tree plantations (HTI) is dedicated to supplying the pulp and paper industry. An existing pulp processing capacity in excess of a sustainable supply of timber remains a major driver of deforestation and degradation of natural forests

There is no question that a sustainable industry will require a rate of supply of timber which is excess of that which can be sourced at sustainable rates from the natural forest. Intensive plantation silviculture on degraded and commercially unproductive land is the strategic option open for this to occur. Investment of this sort will contribute to the growth of the industry and will diminish the pressure on the remaining natural forests. However, for this strategy to be most effective in reducing

emissions, it will be important for the plantation industry to reduce CO_2 loss from the land clearing phase and also to emphasize development on mineral as opposed to peatsoils.

Table 20: A decision framework for planned and unplanned drivers of deforestation and degradation related to the major forest land uses.

Planned forest loss	HTI Plantations	Allow HTI on forested land	Only allow on mineral soil	
			Allow on peat	
		Only allow HTI on cleared land		
	Oil palm	Allow oil palm on forested land	Only allow on mineral soil	
			Allow on peat	
		Only allow oil palm on cleared land		
Unplanned forest loss	Production forest estate	HPH	Achieve sustainable management	
			Existing management	
		Open access	Achieve sustainable management	
			Existing management	
	Conservation forest estate	Conservation forest	Achieve sustainable management	Restore viable areas
				Do not restore
			Existing management	
		Protection forest	Achieve sustainable management	Restore viable areas
				Do not restore
			Existing management	

4.3.1.2 Oil Palm.

The area of land occupied by oil palm plantations in Indonesia has increased 35 fold since 1967 to occupy an estimated 5.6 million ha in 2005[52]. Most of this expansion has occurred in the six provinces of Riau, South Sumatra, North Sumatra, West Kalimantan, Jambi and Central Kalimantan.

The prolific growth of the oil palm sector has conferred important economic benefits: palm oil has become a valuable source of foreign exchange, revenue and employment. A hectare of oil palm in Indonesia produces a *Net Present Value* over 25 years of between $3,388 $2,650 depending on location. Peat soils produce higher yields per hectare than plantations on mineral soils and result in a Net Present Value of $4,265 per hectare[53].

Oil palm expansion has occurred at the expense of Indonesia's natural forest cover and has been implicated in the causes of wildfires and peatland degradation. All of these land use changes have resulted in carbon emissions. More data needs to be collected from provinces in which oil palm is concentrated before a more accurate picture of the impact on deforestation, peatland degradation and carbon emissions can be determined.

4.3.2 Unplanned forest losses

4.3.2.1 Protected areas.

Several studies have attempted to untangle the causes of forest loss within protected areas in Indonesia, mostly focused on conservation forests, and have concluded that multiple factors are involved. Illegal logging and encroachment are the most important and widespread proximate causes, but it is not possible to attribute a specific proportion of the deforestation to them. The factors that combine to allow for illegal logging and encroachment are a lack of enforcement, insufficient incentives for communities and governments for maintaining protected areas, and low capacity of institutions charged with managing the protected areas.

4.3.2.2 Natural Production Forests.

There are two principal drivers of deforestation and degradation from timber harvesting in the production forests:

1. Unsustainable levels of extraction from legally permitted forest concessions
2. Illegal logging at small and large scales

There are, in addition, two issues of land use that contribute to deforestation and degradation:

3. planned conversion of native forest zoned as HPK; and
4. the impact of spontaneous encroachment of production forest by neighbouring communities who may or may not be aware of the boundaries.

[52] Bisinfocus 2006

[53] The Net Present Value of oil palm considered a range of costs associated with oil palm establishment, including land clearing, building roads and drainage, land preparation and planting. It also considered the average yield of Fresh Fruit Bunches (FFB) over a 25 year period (20t/ha/yr) and the price of FFB in 2006 (Rp 706,638 per kg).

Currently, HPH concessionaires are not held accountable for unsustainable logging practices or failure to prevent loss by other actors. The short length of concession agreements also decreases their interest in pursuing sustainable forest management practices such as *Reduced Impact Logging* (RIL).

In addition, significant areas of production forest are not under concessions, but exist as *open access* land. Approximately 18 million hectares of the production forest is not currently managed by concessions, and roughly 60% of it has high levels of forest cover. Loss of forest cover on this land has been high in the past, and will continue to be unless it is brought under effective management.

At the present time the demand for logs exceeds sustainable supply from legal HPH concessions by 9 million cu^3. per annum. Modeling suggests that this may only be reduced to 6 million through the projection period.

This shortfall is driving demand for mixed tropical hardwoods from HTI concessions and HPK conversions and is also the major factor behind illegal logging for international as well as domestic markets. The extent of the problem appears to have been reduced from 10 million m^3 per annum in the early part of the decade to about 1 million m^3 presently.

Forestry policy opposes further conversion of HPK for plantation crops (over and above the agreed areas under the *Padu Serasi.* This policy is based on the authority of a Ministerial Decree)..

A critical factor in predicting forest cover outcomes in production forests is the extent to which local communities are utilizing forest land for livelihood, as well as participating in illegal activities for or with other actors. The number of people dwelling in or near forests is estimated to be in the order of 50-60 million. Many are poor, with little land and few options for maintaining livelihood.

Even if the major drivers of production forest loss were eliminated, degradation and deforestation from the informal and largely undocumented activities of the many people dependent on these forests would continue.

4.4 Resolving land issues between central and local governments

REDD, in ways that other compelling arguments for forest retention have failed to achieve, provides a strong economic case for the sustainable management of all the remaining areas of forest within the country, both inside and outside the forest estate. Retention of forest through avoiding deforestation and degradation creates the opportunity for financial benefits derived from a carbon credit market, to be invested in alternative economic development pathways. This section is concerned with the relationship between local government planning to meet the land use demands for which it has primary responsibility; and the need for central government, through the Ministry of Forestry, to guarantee the long term sustainability of the forest estate for the nation. The legislation under which the roles and responsibilities of the levels of government are defined, determines that an accommodation is reached over what land is going to be primarily in the jurisdiction of local government and what land, in the forest estate will remain in the primary jurisdiction of the central government. There are two questions that are pertinent to resolution of this issue.

1. Can agreement be reached between the levels of government to achieve certainty over jurisdiction? The answer to this question requires answers to two further questions:
    - How much land is required to protect the forest ecosystems of Indonesia and to allow for sustainable forest industries? Conversely,

- How much land and what sort of land does the local government need to have jurisdiction over in order to meet the social and economic needs of the people and its responsibility to offer sustainable development?

2. How should the forest estate be zoned to ensure that it is able to be protected and used sustainably in an environment where it is always likely to be at risk of encroachment and degradation from people seeking to use it for their own alternative economic purposes?

Answers to these questions are essential to arriving at a framework which will allow for the administration of the REDD scheme in Indonesia as it will define how the national and sub-national players in any REDD project interact in initiating REDD activitiy, in implementing them in the field and in ensuring that there is an equitable sharing of the financial benefits of the trade. They will also be very significant to questions of how the REL is set and emission reductions monitored.

4.4.1 The need for certainty between forest land and non-forest land

As local governments seek opportunities for social and economic development, under the opportunities granted to them through decentralized government, there is a constant tension between the use of forest land determined by the central government and the need for the release of more land to local government. This tension was first recognized following the release of the first Spatial Planning Act in 1992 and led to a process seeking harmony between local government purposes and forest land purposes. Enactment of this process of agreement to establish land use certainty began with a Letter of Instruction to Governors from the Minister of Home Affairs in 1993. However, it was in the post-decentralization period following 2001 that active negotiation led to agreed forest boundaries in what is termed *Padu Serasi* between the Minister of Forestry and each Province Governor, except for the Provinces of Riau and Central Kalimantan.

Because these agreements were negotiated at the level of the Province the resulting *Padu Serasi* agreements continue to suffer from two key problems:

- The agreements are mapped at scales of 1:100 000 through to 1: 500 000 consistent with Province Spatial Plans, but inconsistent and impractical in terms of implementation with local government spatial plans mapped at 1:25 000 to 1:50 000.
- There is continuing disagreement between District Local Government Heads (*Bupati*) that their development needs have been acknowledged and addressed in the completed process.

At one level this situation can be interpreted as the Minister acting to retain forest land, and through this action achieve reduced levels of deforestation. Nevertheless, while the level of tension remains high, the risks of *ad hoc* forest release into the future also remain high, as does the certainty over what area of forest and what carbon stock can be guaranteed, and subsequently traded under a REDD scheme.

This situation will remain unclear while there is inconsistency with mapping scales and an absence of reality between what is understood to be the case in central government and what is actually occurring on the ground. The introduction of REDD into Indonesia provides the opportunity, and potentially the resources during the readiness phase, to re-examine the *Padu Serasi* agreements, to reconstruct them at a scale that is consistent with local government spatial planning and to ensure that there is the greatest level of harmony possible between the functional land use zoning that is required under local government spatial planning and the functional land planning and management of forest areas within the Forest Land.

The opportunity is especially timely because of new spatial planning legislation in Act 26/2007 which requires local governments to progressively revise their spatial plans; and the existence of the Government Regulations PP 6/2007 and its revision PP 3/2008 which provides a framework for licensing the use of forest land for a range of environmental services as well as timber products. PP6 and PP3 also accommodate a greater range of community interests through licenses for Community Plantation Forests (HTR), Community Forests (HKm) and Customary Forests (*Hutan Adat*). Used cooperatively this legislation could provide a means of bringing together national and local government land use planning.

Under spatial planning law, local governments identify functional use zones including areas for settlement (*Kawasan pemukiman*); areas for agricultural cultivation *Kawasan Budaya Pertanian*); areas for cultivation of estate crops (*Kawasan Budaya Perkebunan*); areas for forest cultivation or forest retention *(Kawasan Budaya Kehutanan*). It is significant that the Spatial Planning Act 26/2007 requires local governments to identify a minimum of 30% of their land area for green space.

Typically, forest vegetation outside the national forest land is most likely to be owned and subject to management by private interests under the shared jurisdiction of the local government and the Ministry of Forestry (PP3/2008). A joint approach to forest land use planning might identify opportunities to consolidate or redraw forest boundaries to ensure the largest areas of contiguous forest are preserved, thereby minimizing fragmentation.

4.4.2 Integrating management on Forest land.

The Forestry Law, Act 41/1999, introduced a broader range of concepts of forest resources use than had previously existed. In particular these extra uses included the concept of environmental services, e.g., as these relate to water regulation, and also reference to the carbon trade under the climate regime. The Act also introduced a more flexible approach to relationships with local communities and customary land and resource access issues.

Starting with the Government Regulation PP 34/2002, the Ministry of Forestry has been developing the means to effectively implement the Act by specifying concepts, licenses and permitting authorities and procedures. This process was significantly advanced when PP 34/2002 was replaced by PP 6/2007 and its amendments in PP 3/2008. The latter Government Regulations introduced a series of specific community-based forest access licenses, discussed earlier in this report, and also introduced the forest spatial planning instrument known as the Forest Management Unit (*kesatuan pengelolaan hutan*, KPH).

KPH provides a means to rationalize spatial planning of forest functional uses to optimize harmony and ensure improved and potentially integrated ecosystem-scale management decisions, involving more than one forest function. KPH also provides for multi-stakeholder approaches to management consistent with the new, broader range of uses for which forests might be put.

An important element of the legislation related to KPH is that each one is to be administered by a technical unit, comprising multi-stakeholder interests. The head of the KPH will be chosen according to the spatial scale of the forest unit and consistent with the devolution of authorities under regional autonomy. Thus where the boundaries of a KPH lie within a local government District, the Head will be appointed by the Bupati; where a KPH crosses District boundaries the Head will be appointed by the Governor and where the KPH crosses provincial boundaries the Head will be appointed by the Minister of Forestry. Funding for the operation of the KPH will be provided from the national and

regional annual budget and from other non-binding sources, which could presumably include income from REDD carbon trading based upon a REDD project encompassing a single KPH.

The introduction of the concept of KPH is therefore very timely as it represents a further means of linking the interests of central government and local government through a concrete management agency focused on definable ecosystem or landscape boundaries. It provides an administrative infrastructure through which a national REDD scheme could be implemented through projects defined and managed at various sub-national scales.

4.5 Options for strategic management intervention

4.5.1 Protected areas

Indonesia's protected areas – Conservation Forest (Kawasan konservasi) and Protected Forest (*Hutan Lindung*) cover an area of approximately 50 million ha. The protected areas require management intervention to remove unplanned deforestation and degradation. Avoiding deforestation and degradation is thus concerned with the cost of removing illegal activities.

Furthermore, by creating demand for forest carbon, REDD can also provide the financial means and incentives to offset legal, ***planned*** measures to excise land from the forest estate and remove their conservation status. In some cases, REDD may even offer sufficient incentive to expand existing Protected Areas and create new ones with local benefits generated in part from carbon payments. This could be especially significant in facilitating the conservation of increasingly rare, lowland forest some of which is zoned for conversion as HPK.

REDD provides a potential mechanism to fund a management presence which will reduce the projected loss of carbon from native forest ecosystems. Because these ecosystems have not only high values in terms of carbon stock; but have also been set aside as the nation's reserve of its original biodiversity, their enduring protection serves not only to ameliorate climate change but conserves key biodiversity resources and other environmental goods and services.

The challenge for Protected Areas (PA's) management is similar to that faced by production forests; however, the extent of the progress which has been made has always been limited by smaller budget allocations. The challenges are:

- To mark and gazette legal boundaries to PA's within the state forest
- To ensure a sufficient presence of qualified field staff to provide for protection of the forest within these boundaries.
- To ensure that the boundaries and resources within protected areas are not encroached upon or used in ways inconsistent with their conservation purposes, and to have the capacity to enforce protection where necessary.

However, even with these technical advances in place, the long term sustainability of the PA's for their management objectives requires a new context to be established to lend further legitimacy for their existence. Since the decentralization of government in 2001, it has been very difficult for PA managers to focus on these special land use zones without reference to the broader landscape within which there is increasing conflict over space and management options.

The Indonesian, PA system remains largely based on its pre-independence history, and on the national conservation plan set out in 1982. Fundamental changes in governance, in demography and in regional economies since that time make it timely for a reassessment of how PA's fit into the national forestry land and are accommodated into local government spatial planning. More than ever before, the

management of PA's need to be understood in the context of the broader landscape, in which they exist. In the broader landscape, PA's are one of a mosaic of forest, agriculture and settlement zones whose interactions will determine how effectively REDD carbon emissions are regulated.

There are three components to a strategy for reducing emissions from deforestation and degradation of protected areas:

1. The development of a revised national conservation strategy.

Justification. The purpose of this national land allocation revision is to place PA's in the broader forest estate and in the local government jurisdictions within which they sit. This is important in terms of the reduction of carbon emissions because the drivers of unplanned deforestation and forest degradation are the consequence of local attitudes and relationships between local land uses and the allocation of conservation land uses previously established by central government.

Donor support has implemented the first and second national conservation strategies, the last of which was finished some 13 years ago. The enormous changes that have affected Indonesia since this time economically, socially, demographically, in the state of its environment and the form of its government, make it timely for the context of Protected Areas and their management to be re-examined. This need exists for all forest industry sectors but it is particularly important with respect to nature conservation. In this sector the basic management frameworks were established before any of these changes and no longer fit prevailing circumstances.

Because of the size of the protected area estate (*Kawasan Konservasi* and *Hutan Lindung*), the way these forested areas are utilized and regarded, by national, provincial and local governments and the local communities and industry around them, will be a critical factor in the effective implementation of REDD.

REDD Readiness grant funding, would be an appropriate vehicle to support a third National Conservation Plan. REDD market income could subsequently be used to support day-to-day management, recognizing the fact that individual PA's are integral to the ecological functioning of the landscape as a whole.

2. The development of a professional and sufficient management structure.

Justification. The purpose of this strategic intervention is to enhance the competence and knowledge base of both professional management, and the recruitment and resourcing of a field staff able to adequately deal with community interactions (extension) and enforcement.

International experience has confirmed the importance of underpinning PA management with access to appropriate training facilities and career pathways based on staff experience in the field.

It is essential to build a base of well trained para-professional field staff – park rangers – capable of undertaking the day-to-day management of the protected areas under their control. Without this capability, none of the management functions can be effectively carried out. In less populated developed countries the professional profile of park staff can afford to be less focused on people contact. Extension, negotiation, conflict resolution and dialogue; as well as a grounding in the fundamentals of community development and the establishment of SME's, is required by Indonesian Park Rangers.

However, the need for training and education extends throughout the professional echelons as well, with relatively few contemporary management staff understanding international best practice, nor the opportunities of international networking to support the protection of Indonesian PA's. For example, the existence of an Indonesia Chapter of the IUCN World Commission on Protected Areas remains a largely untapped resource.

The nature conservation Directorate-General within the Ministry has been fortunate in the past in having an internationally recognized conservation training school. The revitalization of this school has been assisted by TNC in recent years. This assistance is starting to leverage further modest support from international donors.

The REDD carbon market has the potential to provide for long term, routine funding to maintain such a facility at the forefront of this staffing challenge. REDD funding could also support regional networking with other similar training and educational facilities in Vietnam, Thailand and Australia, for example.

3. The confirmation of boundaries and the completion of the legal gazettal process

Justification. The purpose of this strategic intervention is to complete the legal gazettal process by confirming and marking agreed boundaries of protected areas. The surveying of boundaries has not been completed and without this the final legal gazettal of many protected areas, including national parks cannot be established in law. Until this process is completed it will remain very difficult for field staff to legally resist encroachment from local people and commercial interests.

Boundary surveying would be an appropriate use of funding during the readiness and investment phases of the REDD engagement process and provide a management infrastructure that could support REDD Carbon Trading through improved certainty and permanence of stocks.

There is an important need to incorporate agreement by local people, with proper attention to land tenure concerns, in the final positions of boundaries prior to gazettal. The process of securing local community support opens up significant opportunities for CBM and collaborative management of protected areas, which are lower in the hierarchy of protection such as *Hutan Lindung*. Options could include joint patrolling, or development incentives, such as support for micro-hydro projects or wildlife farming consistent with the management objectives of the PA.

REDD carbon market funds could be used to directly support the implementation of CBM and Collaborative Management options through the establishment of local economic opportunities capable of easing pressure on the protected land and its resources.

4.5.2 Production Forests

Permanent Production Forests in Indonesia comprise a total of approximately 60 million ha[54] which have been zoned according to the following three categories for management purposes:

- Natural Production Forest (*Hutan Produksi Alam – HP-A)*)
- Limited Production Forest (*Hutan Produksi Terbatas*; Generally HP-A ;
- Industrial Plantation Forest (*Hutan Tanaman Industri* – industrial forest plantations)

[54] BAPLAN Forestry Statistics of Indonesia 2006

The criteria used to separate these zones include a consideration of soil type, climate and slope. The difference between natural forest production and limited production forest is related to the extent of logging allowed per ha. It is the difference between natural forest production and plantation forest production which is a key to understanding opportunities for the reduction of carbon emissions within the context of national economic development plans as there has been a history of development – some planned and some related to over-exploitation which has seen the future functions of natural forest concessions changed from a reliance on native forest species within natural forest ecosystems to their replacement by plantations which focus on a limited number of exotic species, especially *Acacia.*

The future of forestry in Indonesia will continue to depend on natural forests and on plantation forests. The reduction in emissions in natural forests will be dependent upon two strategies:

- Increasing market returns associated with the specialist nature of high quality tropical hardwoods to meet the demands of value-adding industries, such as the production of moldings and furniture; and

- The effective implementation of better siliviculture and reduced impact logging leading to sustainable forest management.

It is not expected that large areas of production forest will be newly assigned to protected areas.

With respect to plantations there is general agreement between government and industry stakeholders that the future of the pulp and paper industry will depend upon substantial expansion of the area under plantations and a commensurate shift from the present reliance on multiple tropical hardwood (MTH) species from natural forests, to fast growing plantation species such as *Acacia* and Eucalyptus.

The challenge for Indonesia is to move to a situation where the location and extent of the plantation production forests are clearly planned so that they function within a network of natural forest zones which protect the high levels of biodiversity which are the heritage of the country; and also preserve the ecological processes in the landscape necessary to provide such environmental goods and services as soil and water conservation and potentially tradable carbon. Reduction in demand for timber from natural forests, achieved through an accelerated programme of HTI expansion, could be translated into positive financial incentives for the transition to plantation, through credits saved in the natural forests.

Deforestation and forest degradation in the production forest zones is the result of unplanned and planned drivers. Unplanned drivers are the most significant cause of high emissions in the natural forests, whereas changes to the forest ecosystems associated with plantation establishment are planned. There are clear strategic steps which can be taken to reduce carbon emissions resulting from both unplanned and planned drivers. Most of these steps are already on the agenda of government forestry agencies and the industry. REDD has the potential to provide the funding needed to assist government and industry to implement their agendas much sooner than might otherwise be the case.

Whether for natural forest production, for industrial plantation or for the release of forest for non-forest purposes, projects are of a scale that impact significantly on the landscape and on the environment and the people living within it. The GOI and many financial institutions require that an Environmental Impact Assessment (AMDAL) be conducted prior to the approval of projects which have a significant environmental or social impact. At this time, the GOI's existing EIA requirements – and perhaps those of leading financial institutions -- have no explicit stipulation that the anticipated carbon impacts of the proposed project need to be assessed. REDD signals an opportunity to improve planning, decision making and management of production forestry through the amendment of EIA requirements to include such an assessment which would strongly inform the decision makers of the potential GHG implications of project proposals.

The following strategies are organized to deal with general principles, associated with reducing the impact of unplanned deforestation and degradation. These are then followed by a series of strategies which are more focused on considerations which will reduce the emissions from planned expansion of the area of plantations within the production forest zone.

1. Review the production forest unit zoning to accommodate changes in the areas of forest vegetation in support of decentralized government responsibilities.

Justification. The purpose of this recommendation is to establish a review of the allocation of forest vegetation for production purposes consistent with the circumstances which now exist around the country following the massive changes which have affected it since the East Asia economic crisis. This review could be undertaken at the same time as the proposed review of the national conservation plan. These changes have impacted economic, social and demographic circumstances, the form of government and the condition of the environment. The potential of a REDD market system to contribute to the future condition of Indonesian forests, also makes it timely to review the way individual forest units across the country are to be managed. The need for this re-examination is heightened by the devolution of management responsibilities to provincial and local governments and the introduction of the revolutionary changes towards integrated forest land management embodied in the Government Regulations of PP6/2007, and PP2 and 3 of 2008. The need for review is further strengthened by demands being placed upon the Ministry of Forestry by local governments across the country for the further release of forest land for local government economic development.

The elements of the review include the following:

- A review of the ecological conditions associated with each forest unit to determine current ecological, economic and social viability of the original TGHK classification into Production Forest, Limited Production Forest and Convertible Production Forest. The review would include analysis of the suitability of the current status of the forest to be managed:
    - for tropical hardwood production through selective logging;
    - for restoration for future environmental and biodiversity functions as well as native species production; and
    - for allocation to future industrial plantation.

    Among the criteria to be considered should be a consideration of whether peat soils are present and location in the landscape on the basis that unnecessary carbon losses will be avoided by locating future change from native to plantation ecosystems or other land uses are located in the most appropriate places to minimize environmental impacts. An understanding of whether the forest unit is on peat will allow regulations such as Keppres 32/1990 to be used in deciding permits.

- A review of the condition of *open access* production forest land, residual from the resumption of forest concessions in the late 1990's. The purpose of this review is to determine whether the land continues to be viable in terms of its support of regenerating native production forest; whether it can be utilized for industrial plantation or HTR consistent with national plantation strategies in support of the pulp and paper industries; or whether it should be released for agricultural or other purposes because of deforestation or a level of forest degradation which would not permit restoration.

In those areas where spontaneous in-migration has established land use patterns difficult to change without serious social consequences, review opportunities to secure land access among local people and potential for collaborative land use involving HTR projects. These economic opportunities in the forest industry would include the potential for partnerships with forest concession companies and out-grower plantation schemes with guaranteed access to markets.

This review could be undertaken in the context of what has emerged as a necessary reconsideration of the results of the *Padu Serasi* process in order to meet accumulating demands from local governments throughout country for further release of forest land for alternative land uses. This demand determines that the scale of the national planning review should be consistent with local government planning of 1:50 000. REDD offers a unique opportunity for the problems of land allocation to be dealt with at a national level rather than as a series of *ad hoc* decisions. In this way the extent of forest land can be settled in a way which assures that planned deforestation for national economic development is incorporated in a national baseline for future carbon accounting.

The most important outcome of this review is the opportunity to identify the boundaries of forest management units (KPH) and to determine the internal zoning of these units and the potential management structures as specified in PP6/2007 and PP3/2008.

The implementation of local government partnership will be technically challenging but is essential in terms of resolving the issues of carbon stock and the roles of national and local government payment distribution under a REDD mechanism.

The implementation of this review could be appropriately funded during the Readiness Phase with grant funding.

2. Reduce the flow of illegal logs into the market.

Justification. The reduction of Illegal logging requires action to reduce both demand and supply. The Ministry of Forestry is embarked on an extensive program to reduce illegal logging and substantial budgets have already been made available for enforcement and also industry reform. The following steps constitute the necessary management framework:

- *Enforce laws against illegal logging.* The GOI has allocated $70 million per annum to this process, sufficient to produce effective outcomes in the framework of a comprehensive Forest Law Enforcement National Strategy (FLENS).

- *Create alternative log supply.* Plantation sources are required to meet the 9 million m^3 shortfall of logs which is creating demand for illegal log supplies. Until planned increases in Indonesian plantation capacity have been achieved, Indonesia may consider sourcing plantation timber from international markets. Deregulation will help drive industry restructuring towards sustainability.

- *Re-structure wood products sector.* The industry revitalization roadmap calls for greater focus on high value-added products, framing, molding, furniture manufacture and carving, to grow trade while reducing demand for logs. A REDD financed industry subsidy of US$100 million could drive this restructuring.

3. Review management practices in production forest units to optimize REDD opportunities:

Justification. Indonesia has the necessary elements of a national framework for sustainable forest management, but implementation through the forest concession companies continues to be

challenging. Partnership with industry needs to be based on an incentive framework which rewards international best practice in sustainable plantation forest management; encourages practices which reduce carbon emissions; minimize social impacts; encourages best practice among smaller operators and improves transparency in the industry as it relates to technological innovation and environmental impacts.

International experience suggests that the following policy additions may achieve substantial reduction in carbon emissions by encouraging improved management in the forest units:

- The provision of incentives to achieve stipulated *outcomes* of management rather than compliance to prescribed actions. For example, a focus on outcomes would allow greater flexibility in the application of silviculture to best meet local conditions. More traditional concession management by government tends to focus on prescription of permitted activities which are not adaptive and may not result in the outcomes desired by all parties.
- The use of *performance bonding* to provide a contractual commitment to maintain performance standards. This commonly used approach in the mining industry carries significant economic consequences.
- The provision of incentives, such as preferential access to new concessions, longer-term management rights (30 year), financial subsidies or tax breaks, training and extension, to natural forest and plantation concessions for implementing practices which reduce carbon emissions. Carbon emission reduction will follow if the requirements of international certification (LEI or FSC) and the guidelines for Reduced Impact Logging (RIL) are taken up. RIL Guidelines exist for both plantation and natural forest management**.**
- Support adoption of accountable 'sustainability targets' by each pulp producer to encourage transparency between the pulp mill demand and capacity to supply chips sustainable forest management. This requirement could offer positive incentives, including short term assistance from REDD funds to ensure easier transition for pulp producers to make the transition away from dependence on MTH species. Because the number of operators of pulp mills is small, cooperation from the industry could result in large improvements in the short term of the Readiness Phase up to 2012.

Support collaborative management arrangements between forest concession companies, using similar incentives to above. Collaborative management may facilitate community involvement in production forest, including plantations, reduce conflict and reduce illegal logging. A number of new legal and policy instruments for community-based, collaborative forest management have recently been introduced under Government Regulation 6/2007, including Community Forests (HKM), Community Forest Plantations (HTM), and Customary Forests (Hutan Adat). These new types of arrangement can be further developed and field-tested as part of REDD pilots.

4. Capitalize on the opportunity of the REDD Market instrument to realize planned strategic reform of the pulp and paper industry to achieve a sustainable forest plantation sector.

Justification. Indonesia has the capability to be a global leader in the production of pulp for paper. Linked to extensive forest land and a strategic location in relation to expanding Asia-Pacific markets, the significant contribution which the pulp and paper industry make to national earnings is only threatened by issues of continuing supply of wood chip. Indonesia relies too heavily, in comparison to the rest of the world, on the use of multiple tropical timber species (MTH) taken from native primary and secondary forests. It is widely acknowledged that this situation is not sustainable because expanding pulp production has never been linked to the provision of sustainable supplies of wood chip. Indonesia continues to have a shortfall in its fibre supply in terms of its plans for expanded

production. This situation has become further exacerbated by the growth of the plantation pulp wood chip markets, particularly in China, which is now making further demand on the slowly expanding proportion of Indonesia woodchips coming from plantation sources.

An integrated strategy to move efficiently towards a reliance on plantation timber will stand the best opportunity for cost effective implementation if it can be tied to REDD-based financial subsidization, a process for which is immediately available through international donor and investment sources. The size of the subsidy which is potentially achievable will depend upon the extent to which changes and reforms in the forest and pulp industries can reduce the significant level of carbon emissions resulting from historic business-as-usual land use and management decisions. The following steps are recommended as integral to the required strategy.

Strengthen the criteria for approval of new plantations in Production Forest. Approximately 54% of land currently allocated for HTI development is covered by primary and secondary forest. While further removal of native forest may be required to meet projected plantation needs, the decisions over when, where and how much would achieve significant emissions savings if there was emphasis on maximizing production on those areas which have already been allocated for plantation. For example, as well as the need to press plantation industries to complete their commitments to establishing plantations on existing concessions, there are already extensive areas of old growth Acacia in Kalimantan and Sumatra that could be harvested immediately and replaced with new plantings of fast growing genotypes. A further consideration in approving new plantation proposals which would show industry leadership by encouraging good forest management is the record of the proponent in relation to other plantation concessions.

Increase the cost of using MTH and/or restrict its use for pulp production. In order to drive this initial focus on optimizing existing plantations, government leadership of the industry would be assisted by ensuring the cost of MTH was increased to reflect its value for whole timber or veneers in support of value-added timber industries. The discounted cost of MTH has been a strong economic driver for replacing natural forest. This policy would assist in the projected implementation of a change away from MTH to plantation timber by 2009 as proposed in existing legislation.

Regulate the export of wood chips and pulpwood logs. By providing incentives for the sale of plantation wood chips to domestic markets until the shortfall of plantation production has been overcome two outcomes favoring carbon emission reduction could be achieved:

- Earlier reform of the pulp and paper production supply chain as proposed under future industry proposals; and
- A reduction in demand for MTH with a concomitant decrease in the pressure on native forests and the time and opportunity for the development of plantation production under HTI and HTR initiatives on *open access* forest areas made available through resumed or abandoned concessions.

Encourage carbon-positive pulp and plantation projects by improving due diligence in the financial sector.

The mitigation of climate change requires a commitment among all industries and communities to the reduction in emissions. Indonesia is a high profile participant in this process of encouraging green development. Associated with projected expansion in the paper industry through increased pulp production capacity, it is timely for government to take a lead in ensuring that new proposals are in accordance with low carbon emission technologies. This includes the production of woodchip and therefore involves active participation by the Ministry of Forestry. It also requires financial institutions and international money markets to be aware of the pressure they can exercise to ensure investments minimize carbon emissions by promoting essentials new industry approaches. There is also a need for

the development of improved tools for financial due diligence and risk analysis, as well as channels for ongoing information sharing with financial sector decision-makers.

4.5.3 Oil Palm

The oil palm industry is continuing to expand rapidly as Indonesia becomes the largest producer of organic oils from this source.

Oil Palm is regarded as an estate crop and not a forest product. The industry is therefore regulated under the Ministry of Agriculture; the land on which the plantations are established are subject to local government jurisdiction, and the kabupaten receives income directly from the land use which is identified in its spatial plan. The analyses presented in the technical study which underpins these strategic recommendations demonstrates that there is sufficient suitable land available for Indonesia to meet the projected requirements for oil palm production targets, without the further removal of native forest.

However, it is not the existence of already converted or degraded land that will directly mitigate the pressure for further conversion, but rather the location of the land as it corresponds to the strategic economic development plans of local governments, and their negotiations with the major oil palm companies. This situation is both a challenge and an opportunity for the potential reduction in emissions from this industry. It is a challenge because reform will require strong engagement with local governments and their agencies who will need to be convinced of the reality of economic development opportunities associated with REDD – as compared to the tested reality of an established, tangible oil palm plantation. It is an opportunity to the extent that real engagement at the scale of local government and with decision-makers who must choose land uses at spatial scales affecting real people and real pieces of land does offer the potential for the successful re-direction of economic development which also values the less tangible resources of forests represented by carbon, biodiversity and other environmental services.

Strategies to reduce the level of carbon emissions for oil palm therefore involve a number of agencies beyond the Ministry of Forestry. At the national level these include those related to trade and finance as well as agriculture, while local government, including the DPRD will need to be able to accommodate new alternative economic development plans which they may not have previously considered in their strategic, long term and medium term plans.

The Ministry of Forestry does have an important continuing role to play in the process of reducing emissions from the forest conversion which has been an integral part of the development of the industry, especially in Sumatra. This role is based on the assumption that the Convertible Forest Zone (HPK) remains within the forest land until it is released by ministerial decree to the alternative non-forest use. It assumes that while HPK has been previously identified in Forest Estate land use planning and can therefore be legally converted, this zoning is capable of being routinely reviewed as the nation periodically assesses the status of its natural resources through long term and medium term strategic planning. It is further based on the presumption that agreements have been reached, under the process of *Padu Serasi*, between the Minister of Forestry and the Provincial Governors over what land is to be released from the National Forest Land and that while local governments may be continuing to petition the Minister of Forestry for further land releases, the essential completion of the *padu serasi process* places a responsibility on all levels of government to respond carefully and in the context of a national economic interest which responsibly must consider all resource options.

The following strategic interventions are recommended as options which will achieve significant reductions in carbon emissions through industry reforms that should have minimal legitimate short

term economic impacts.

1. Consolidate policy and approval criteria for releasing HPK for oil palm developments.

Justification. The Ministry of Forestry has responsibility for issuing permits for the release of HPK from the Forest Estate. Where these decisions result in the continuing removal of forest ecosystems they will impact upon the quality and therefore the market price of any REDD carbon Indonesia wishes to trade into the future. This situation can be improved by adopting transparent decision criteria resulting in the release of further HPK for oil palm development. Figure 22 presents a decision framework which might be considered. These criteria include:

- the location of the concession (i.e. is it located on forested lands or peat soils);
- overlapping land uses (i.e. logging, agriculture and agroforestry, mining and industrial timber concessions) and tenurial claims;
- the proximity of the concession to a crude palm oil (CPO) processing mill;
- soil, topography and climate suitability;
- infrastructure needs; and
- the applicant's finances

A policy requiring these decision criteria could be used by the Minister to apply positive pressure on the industry and on local government to prioritize the use of already deforested land.

2. Review spatial plans to optimize degraded lands.

Justification. This strategy involves identifying degraded lands suitable for oil palm plantation. Indonesia has 23.2 million ha of degraded lands, of which only 7-9 million ha is needed for Indonesia to meet its 2020 palm oil production target. A comprehensive analysis will need to be undertaken to determine how much of the degraded land can be allocated for oil palm. Plantations on degraded land, including *Imperata* grasslands[55] would allow Indonesia to claim significant carbon credits in avoided deforestation.

3. Intensify production per unit of land.

Justification. There is the potential to greatly increase production of oil palm per ha through government support for:

- Smallholder production (typically only 60% of industrial plantation production); and
- Revitalization of old plantings (greater than 25years) with new higher yielding stock.

4. Require zero burning.

Justification. Oil palm plantations continue to use fire to clear land because it is cheaper than mechanical land clearing, which in the case of peatlands can be $50-$150/ha. Smallholders also use fire. Reducing the use of fire will significantly reduce carbon emissions. REDD credits could be used to subsidize mechanical clearing.

[55] Germer & Sauerborn 2007

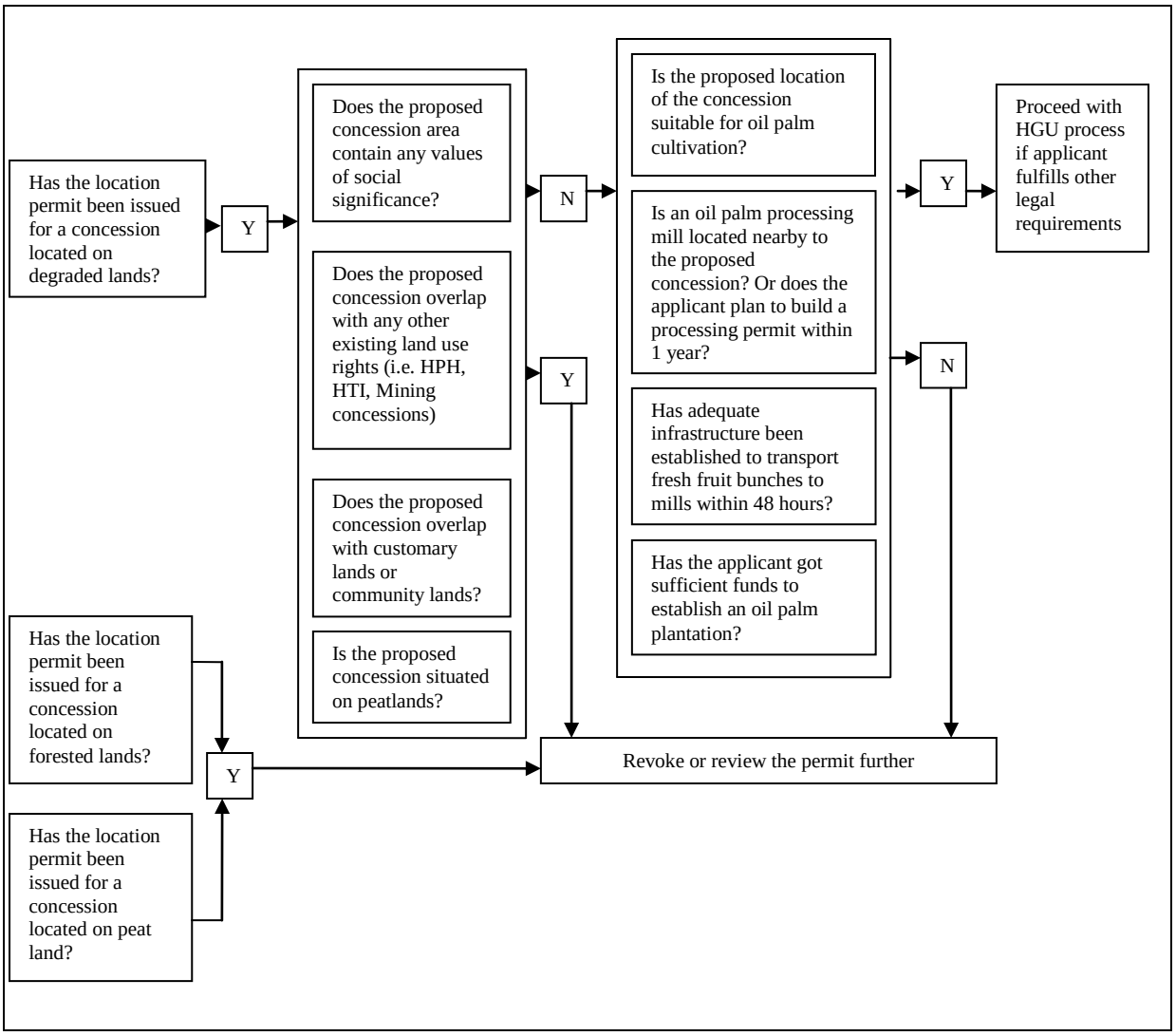


Figure 22: Factors to consider when reviewing location permits

4.5.4 Peatlands

The reduction in carbon emissions from peatlands is complex because of the natural variation in the depth and original vegetation cover of the peat; and also because of the fact that peatland supports a broad range of land uses from lowland tropical forest in protected areas, natural and plantation production forests, estate crops and agriculture. Across this range of land uses there are differences in jurisdiction with the Ministry of Forestry only one of the stakeholders. The Ministry of Agriculture and particularly local government carry such widespread authority over land use decisions on peat that a whole of government strategy is required.

Technically, opportunities for strategic interventions into the reduction of emissions on peat, that has undergone land use change from its original condition, are limited but straight forward. They focus on the causes of emissions: oxidation of drained peat undergoing conversion to non-forested land uses; and burning of the dried organic matter which comprises the peat. The implementation of these two technical approaches cannot occur and cannot be effective without attention to governance in its broader sense. These interventions are described in the first three recommendations.

Because of the importance of peat as a carbon store, the retention of as much as possible of the remaining peat areas under their original vegetation cover is very important to Indonesia's gross impacts on carbon emissions from deforestation and forest degradation. The Ministry of Forestry has the authority to regulate the extent of future land use change over extensive areas of remaining natural peatland through the enforcement of existing legislation and policies in relation to new forest plantations in Permanent Production Forest zones, and also in permitting the release of Convertible Production Forest to non-forest purposes such as estate crops, including oil palm, and other land uses under local government jurisdiction. The final two recommendations therefore relate specifically to the role of the MoFr in land use changes on peat soils for industrial timber plantations and oil palm.

1. Regulate and Restore Water Tables

Justification. The purpose of this intervention is to reduce the oxidation which occurs as peat is drained for forest plantation, agriculture or estate crops. Oxidation is followed by compaction that causes peat subsidence. This process encourages land managers to further drain by deepening the drainage canals and this in turn causes further subsidence. Subsidence can be limited by regulating the height of water tables as close to the surface as possible while optimizing the root environment of the new crops.

The importance of this regulatory process for the Ministry of Agriculture can be appreciated when it is considered that 17% and 13% of the land use permits issued for oil palm developments have been issued for concessions lying on peat soils in Kalimantan and Riau respectively. Drainage and oxidation of peat in these locations is emitting large quantities of carbon. By maintaining the water table 0.5-0.7m from the soil surface oxidation of the peat soil can be minimized.

On degraded peatland the use of small dams in existing drainage canals can be effective in re-establishing water tables at the desired height to promote the re-establishment of a vegetation cover.[56]

Reduction in carbon emissions from strategic locations in Kalimantan and Sumatra through the application of water table manipulation might be considered as an important objective for pilot projects during the readiness phase, supported by grant funding from multilateral and bilateral sources.

2. Prevent Fire

Justification. Fire is the most direct cause of GHG emission. Indonesian peatlands, particularly in Sumatra have burnt regularly towards the end of the dry season and at increasing intervals since the early 1990's. The high organic content of peat soils has meant that emissions from peatlands are far higher than that caused by fire in forests on mineral soils. Fire has been used by small landholders to prepare land for cultivation and has also been used extensively as a means of converting forest and scrub vegetation prior to the establishment of oil palm and other estate crops.

The prevention of annual fires on peatlands requires industry and community behavior change to safeguard land from fire and to use other, mechanical approaches to land cultivation. It also requires local government to commit to the prevention and control of fire with investment in enhanced capacity and equipment; and to refer to the existing extensive regulatory framework designed to provide legal enforcement of fire prevention (Table 21)

While satellite imaging technology allows fire to be monitored at a national scale, fire prevention and control requires local infrastructure and capacity, extending across the sectors of government and reaching into local communities where behavior change away from the use of fire would need to be

[56] Communities that have come to depend on canals for access and transport will need other livelihood options, incentives, and possibly compensation. Illegal loggers—who use the canals to transport logs--must be controlled, which is a governance challenge rather than a technical problem.

supported by equipment and institutions (e.g., village fire fighting units). Community fire management has already been implemented in several places and incentives are required to consolidate and expand this facility.

While grant funding as part of the readiness phase could be appropriately used to pilot local fire prevention programs, the size of the changes needed to effectively reduce carbon emissions from peat fires would benefit from a higher level of investment funding before 2012.

Once infrastructure is in place, the maintenance and expansion of capacity and capability could be supported by carbon market returns.

Table 21 Relevant legal instruments designed to control fire**.**

- PP No. 4/2001, forbids all forest and land fires
- Minister of Forestry Decree Kepmen No. 260/Kep-II/1995 on Guidelines for Prevention and Control of Forest Fire, supplemented with the implementation guidelines
- Director General of Forest Protection and Nature Conservation (PHPA) Decree No. 243/Kpts/DJ.VI/1995 on Technical Guidelines for Forest Fire Prevention and Control in Concession areas and other land use
- Director General of Estate Crops Decree No. 38/KB.110/DJ.BUN/05.95 on Technical Guidelines for Land Clearance without Burning to Develop Plantations
- While strict legal penalties for persons causing fire are stipulated in UU No. 41/1999, article 78 clauses 3, 4 and 11, as follows :
    - *Intentionally setting fire to forest* : Prison sentence maximum 15 years and a maximum fine of 5 billion rupiah
    - *Negligence leading to forest fire* : Prison sentence maximum 5 years and a maximum fine of 1.5 billion rupiah
    - *Dumping of materials which can cause forest fire* : Prison sentence maximum 3 years and a maximum fine of 1billion rupiah
- Government Regulation No 28/1985 on Forest Protection.
    - Article 10 point 1. (burning the forest on purpose will be fined with a maximum of 10 years in prison or Rp 100 million)
    - Article 18 point 3b. (burning of forest as a result of carelessness will be fined a maximum of 1 year in prison or Rp 10 million)

3. Build coordination and consistency across government jurisdictions and sectors to control cross boundary impacts of fire (control of sources and control of spread).

Justification. The widespread distribution of peat in the lowlands of Sumatra and Kalimantan, and the characteristic form of their development around deep domes, create complex challenges to land managers who have to balance decisions on localized site developments with the potential for widespread impacts beyond the boundaries of the licensed land use change. Sub-surface water movements and drainage; and the spread of fire across peat landscapes do not stop at the boundaries between different land uses, nor the boundaries between local government jurisdictions. Significant progress in the reduction of emissions from peat therefore involves a new and higher level of cooperation and coordination among government agencies and across local government boundaries.

Effective management of water and forests at a landscape scale requires complex and robust institutional arrangements and coordination of resource-users and decision-makers across sectors, jurisdictions, and levels of government and other literature on common property and multi-purpose

natural resource management). Solutions can draw on traditional Indonesian models (e.g., Balinese *subak*) as well as international experience.

A model for such a spatially integrated approach exists in the long standing concept of River Basin Management (*Daerah Aliran Sungei*). However, the translation of this approach to peatlands where the movements of water are sub-surface and fire is the other critical landscape flow, will involve substantial education and awareness raising program which could be implemented through either kabupaten or province civil service training boards (*Badan DIKLAT*). These programs ought to target not only civil servants but also DPRD members in order to achieve informed land use decisions, and also cross-boundary cooperation.

A newly established mechanism for the implementation of the approach at the local government or provincial government scale is the Forest Management Unit (*Kesatuan Pengelolaan Hutan – KPH*), introduced in PP6/2007 and elaborated in PP3/2008. These pieces of legislation specifically identify carbon as a tradable environmental good of forests and set up a management process which encompasses the range of forest zones within an identifiable forest area, which may fall within a Kabupatan or extend across two or more. Unfortunately, in terms of peatlands the KPH deals only with forest estate so agricultural or other non-forest land uses would need to be coordinated in an enhanced organizational structure. The form of this structure would need to be determined within each local government jurisdiction depending on their individual allocations of responsibilities among the local government agencies.

Readiness grant funding could be used to develop training materials and to implement pilot training-of-trainers in the *DIKLAT* in key provinces such as Riau, Jambi and West and Central Kalimantan. This project could be linked to target Kabupatan where the infrastructure for coordinated peatland management could be similarly piloted during the Readiness Phase.

Legislative and policy framework. ***Tehre are number of national legislation on the use of peat land, issued by different sectors***. For example, Presidential Decree (Keppres) No. 32/1990 stipulates that peat areas deeper than 3 meters should not be developed; Guidelines from the Minister of Agriculture stipulate that areas with up to 76 cm deep peat are suitable for conversion to agriculture, while the Kepmen No.14/M. Ekon/12/2001: Direction of National Policy on Water Resources promotes the process of integrated water resources management between inter-related sectors and regions at the central, provincial, and district/town levels, and at river basins, and encourages the establishment of appropriate institutions or inter-actor coordination forums for rivers flowing across provincial boundaries. These Regulations need to be harmonized in order to effectively manage peatland resources, which are under different juridiction, in a sustainable manner.

4. Regulate further conversion of peatlands and revise and enforce rules for management of existing peatland plantation sites.

Justification. The large amount of carbon stored by peat soils and the losses that occur following logging and drainage make a decision to prevent further plantations on peat an obvious strategy for reducing emissions.

Where it is impossible to avoid disturbance of peatlands for industrial plantations, deep peat should be avoided. Because of the extent of recent losses to the peatlands of Sumatra and Kalimantan the existing limitation on using peat over 3 metres deep should be broadened to protect a greater range, by adopting, for example the Ministry of Agriculture guideline of utilizing only peat with a depth of less than 0.75 m. Currently the Government of Indonesia under coordination of the Ministry of Agriculture is working on imrpoving regulations concerning peatland management , including water table management and drainage of peat areas following plantation establishment. In peatland areas that

are already managed as plantations, REDD payments could be used to defray the costs of reducing emissions through improved water management.

5 Implement land swaps where possible to retain high carbon value forest and peats while allocating alternative land for new plantations.

Justification. This strategy is based on a technical review of potential oil palm locations as the basis for a series of land swaps which might be negotiated with the oil palm companies which hold concessions on forest with high carbon values. The rationalization of forest land planning, incorporating a new consideration of the intrinsic value of carbon, implied in this action, has the potential to have the greatest impact on Indonesia's efforts in relation to containing carbon dioxide emissions.

The recommendation has previously been discussed outside the IFCA process and has attracted interest from provincial governments and companies who see it as an opportunity for a *win-win* solution.

REDD financing may be deployed to cover the opportunity costs lost from not converting forested lands and peat lands to oil palm. Assuming forested lands have an average carbon stock of 100 tons (equivalent to 367 tonnes of carbon dioxide), valued at \$4/tonne CO_2, each hectare could generate \$1,468. Peat lands could generate several times that value.

4.5.5 Contribution to the Ministry of Forestry Long Term Development Plan 2006-2025

The strategic recommendations presented in section this chapter are based on the IFCA analysis of the status of Indonesia's forests and their global ecological and socio-economic context. It is not therefore surprising that they pick up on issues and themes that have been raised on many previous occasions. It is not the issues that are complex to understand; but the practical options that exist to achieve a sustainable future where the remaining forests play their optimal part to secure economic recovery while providing the environmental goods and services which must underpin opportunities for a better life for millions of people.

The commonality of views between the national and international experts which have contributed to the IFCA studies and those within the Ministry of Forestry who have contributed to this and other analyses, can be appreciated by reviewing the strategic recommendations in relation to the goals and objectives of the Ministry of Forestry Long Term Development Plan 2006-2025. This analysis is presented in Table 22. Clearly the fit is not a word for word matching as the two documents were constructed in quite different ways. However, the intention and theme of the priorities have a strong commonality.

The contribution that the REDD initiative can make to the realization of the goals and objectives of the Long Term Development Plan are through providing a source of focused investment which will continue because it will be based on the preservation of the stored carbon resource within the forest itself and not on a diminishing natural resource associated with non-sustainable forest management practices.

Table 22: How the implementation of recommended REDD forest industry strategies can assist in the realization of the Ministry of Forestry Long Term Development Plan 2006-2025

Forestry Long Term Plan Goals and Objectives	Recommended REDD Strategies
To create a strong institutional framework for forestry development • Establish efficient, cost effective and accountable forest management institutions at all levels of government and in civil society through emphasis on KPH management units • Increase the human resources available for forest management with emphasis on competence and professionalism • Increase the role of civil society in forest management, with emphasis on expanding synergy among stakeholders	• Review management practices in production forest units to optimize REDD opportunities. • Development a professional and sufficient management structure through the establishment of a networked training and education program linking Indonesian and international forestry training institutions

To increase the value and sustainable productivity of forest resources
• Guarantee the existence of the Forest Estate at an optimal size by:
  o Increasing the legal provisions
  o Decreasing forest degradation
  o Increasing plantation to increase forest area
• Optimize hydrological services of watersheds
• Conserve biodiversity in KK and all other forest zones
• Optimize the value of forest resources for timber and non-timber products, recreation and environmental services to impact on the level of poverty and contribute to national economy.
	• Review the Production Forest unit zoning to accommodate changes in the areas of forest vegetation in support of decentralized government responsibilities.
	• Development a revised national conservation strategy consistent with contemporary forest conditions and decentralized governance.
	• Confirm boundaries of the Forest Estate and the completion of the legal gazettal process
	• Consolidate policy and approval criteria for releasing HPK for oil palm developments.

To develop forestry products and services that are environmentally friendly, competitive and have a high added-value • Increase forest component of GDP by 3X 2005 levels by increasing plantation timber supply, non-timber products, recreation and environmental services. • Achieve international benchmarking by applying new technologies for value-added product development and increased supply of timber from plantation and community forests. • Develop innovative new forest products from a effective efficient and environmentally friendly	• Capitalize on the opportunity of the REDD Market instrument to realize planned strategic reform of the pulp and paper industry to achieve a sustainable forest plantation sector • Require zero burning for land clearing for plantation and oil palm development and work with local governments and international assistance to develop a professional and decentralized forest fire service • Regulate and Restore water tables on peat lands

management system. ***To improve the enabling environment for forest investment*** • Promote a safe and profitable industry for investors and public ***To Promote forestry products and services*** ***To promote an active role for society in supporting responsible and equitable forest management*** • Guarantee increased revenue to community through profit sharing system that is transparent and equitable. • Increase the independence of communities to manage forest areas on the Forest Estate through group empowerment and multi-stakeholder participation • Increase the area of independent and sustainable community forests (*hutan rakyat*). • Resolve social conflict related to forest management to improve benefits flowing to community livelihoods	• Reduce the flow of illegal logs into the market • Intensify production per unit of land for plantations and oil palm. • Build coordination and consistency acros government jurisdictions and sectors to control cross-boundary impacts of fir (control of sources and control of spread). • Review spatial plans to optimize degraded lands • Regulate further conversion of peatland and revise and enforce rules fo management of existing peatland plantatio sites. • Implement land swaps where possible to retain high carbon value forest and peats while allocating alternative land for new plantations.

4.6 Opportunity Cost: concept and application

Strategic interventions to divert pressure on natural forests and reduce deforestation need to rest on reforms that would lead major actors - industry, local communities, loggers and so on – to switch to economic uses of the land which favored carbon retention. The concept of *opportunity cost* provides an economic instrument by which the value of preserved carbon can be compared with the value of using other forest resources such as the timber or the land on which the forest is growing. *Opportunity cost* is defined as the cost incurred by choosing one option over the next best alternative. Assessing opportunity costs is fundamental to assessing the true cost of any course of action. Box 3 presents an

example of how *opportunity costs* could be applied to demonstrate the value of carbon versus the value of an alternative use.

Box 3. The calculation of an opportunity cost

Land use Option A involves the clearing of natural forest to establish an industrial plantation for pulp. This option produces theoretical revenues equal to 6.000 monetary units. Also assume that associated costs reach 1000 monetary units. Therefore the net revenue of adopting this option is 6000-1000=5000.

Land use Option B is to avoid the deforestation in order to conserve the carbon credits within the natural forest..

By choosing Option B 5000 units of revenue would be lost: this is the Opportunity Cost.

Option B offers net revenues of only 1600 monetary units. If financial considerations are important the decision to proceed with Option A should stand. To choose Option B would require a government subsidy of at least 3,400 financial units, provided directly or through reduced costs, tax or technical assistance. If the costs of the subsidies could be recouped by selling carbon credits equivalent to those saved in reduced emissions, Option B becomes a financially superior because it not only preserves the carbon resource but also other goods and services within the forest including water regulation and biodiversity.

The amount of the additional value that would be required to justify a switch from option A to Option B (in this case a minimum of 5000-1600=3400) can be translated into an equivalent minimum value of a ton of carbon that would allow the government to finance the difference. This is the "breakeven" price of CO_2 emissions.

The accounting cost and the opportunity cost are not the same thing. It would not be sufficient for the government to compensate the additional costs of switching to plantations on degraded lands only. In the example, it would not be enough for government to cover the difference (1400-1000=400) by, for example reducing taxes. This would increase net revenue to only 2000 monetary units. While this financial gain may still be an attractive it is not as attractive as Option A. The *true* cost of switching from natural forest to degraded land is what is sacrificed in the move, 5000 monetary units. It would be logical therefore to continue with option A and deforestation would not be reduced.

	Option A: Deforestation followed by Plantations	Option B Plantations on Degraded Lands
Revenues	6000	3000
Cost	1000	1400
Net revenue	5000	1600

Managing a forest to preserve its carbon resource implies a sacrifice of benefits that could have been materialized if REDD were not the management objective. For example to persuade loggers to abandon logging of natural forest, would require offering them production options that would be at least as attractive as the benefits they sacrifice by not engaging in activities leading to deforestation.

Opportunity cost can also be calculated for other, broader decision-making purposes: for example, to determine the impact on the economy as a whole, of reducing deforestation. In this case the "sacrifice" may include several economic dimensions not normally translated into financial equivalents. Land uses leading to deforestation may generate local employment and the value of the social and economic impacts which need to be evaluated against a decision to change the land use. This situation existed in Australia in the 1990's when the decision was taken to eliminate the timber industry from the Wet Tropics region of North East Queensland in favor of establishing a new development focus on tourism.

Provisional data derived from the literature on estimated opportunity costs of deforestation and equivalent breakeven values expressed as net present values (NPV, i.e. with future values discounted to the present) under various land use options are presented in Table 23[57]. These values provide a comparative scale of magnitude of the cost to the country of stopping or reducing deforestation[58]. If the REDD initiatives generate international carbon credit payments that exceed these opportunity costs, Indonesia would have the financial incentive to adopt REDD.

Land uses that have the highest NPV are oil palm and timber plantations. Using a discount rate of 10% over four rotations, spanning 28 years, the estimated NPV's of *Acacia* timber plantations, range from $1,648 on peat soils to $2,634 on mineral soils. Because plantations are largely established by pulp and paper companies that use the logs in their mills, there is no established market price for those logs in Indonesia. The NPV estimates are based on a sale price of $40 per tonne, which industry sources suggest is a reasonable estimate of production costs. Plantations on peat soil have a lower NPV than those on mineral soils because timber yields are lower.

The NPV's of oil palm plantations range from $3,963 on mineral soil to $4,265 on peat soil. The NPV on peat soil is higher because oil palms on peats have higher yields than on mineral soil and the establishment and maintenance costs increase less than proportionally with respect to the higher yields.

The other land uses reported in the table represent typical agricultural activities carried out by smallholders. They have significantly lower NPVs.

The NPV's which have been estimated translate to a similar broad range of break-even values for the tradeable carbon credits, which would be required to prompt an economic reason to retain the forest vegetation and its carbon resource stock.

[57] The costs and benefit of an activity are normally distributed over several years, for example, an oil palm plantation has costs and benefits distribute over a 25 year period, assuming that it is replanted after 25 years. The NPV basically yields the net value of the cash flow, which measures the difference between the future revenues and the costs of production. The NPV approach was also used in the Stern report to assess the potential cost of avoiding emissions from deforestation.

[58] The data presented in Table 23 are provisional and do not fully represent the significant variation in economic returns from land uses and carbon stocks.

Table 23. A provisional analysis of opportunity costs and break even prices for CO_2 in relation to a range of forest land uses.

Land use	Opportunity cost of deforestation ($/ha)	Forest type	Soil type	Emissions (t CO2e)	Break even price of CO2e ($/t)
Timber extraction	450	Primary		110	4.09
Timber plantation	1,073	Degraded	Mineral	184	5.83
	399	Degraded	Peat	1018	0.39
Timber + Timber plantation	1,523	Primary	Mineral	661	2.30
	849	Primary	Peat	1385	0.61
Oil palm plantation	3,963	Degraded	Mineral	184	21.54
	4,265	Degraded	Peat	1018	4.19
Timber + Oil palm plantation	4,413	Primary	Mineral	661	6.68
	4,715	Primary	Peat	1385	3.40
Rubber	36	Degraded	Mineral	184	0.20
Timber + Rubber	486	Primary	Mineral	661	0.74
Rice fallow	26	Degraded	Mineral	184	0.14
Timber + Rice fallow	476	Primary	Mineral	661	0.72
Cassava	18	Degraded	Mineral	184	0.10
Timber + Cassava	468	Primary	Mineral	661	0.71

Assumptions:

- Primary mineral forest has a carbon stock of tC 180 (ie tCO2 660), primary peat forest tC 150 (ie tCO2 550)
- Degraded forest has a carbon stock of tC 50 (ie tCO2 550) on mineral and peat soil
- Timber extraction leads to a loss of tC 30 (ie tCO2 110)
- No carbon loss from mineral soil is included
- Carbon in peat soil is lost at an annual rate of 9.1t/ha/yr (ie tCO2 33.4) over 25 yr period

4.7 A phased approach to achieving REDD targets

REDD payments are intended to support and provide incentives for effective long-term strategies to reduce deforestation and degradation. However, REDD buyers are willing to pay for actual reductions and may not be willing to pay much if anything for the mere promise of future reductions.

Nevertheless, sustained reduction in deforestation rates is unlikely without careful planning and good governance in the implementation of plans. Therefore, some form of intermediate payments could be useful to:

- reward the achievement of critical milestones (intermediate results or indicators of progress) towards full implementation of plans;

- facilitate further progress towards successive milestones; and
- finance future payments to encourage long-term investment and ensure sustainability.

Examples of milestones are the adoption of integrated spatial plans incorporating REDD targets; passage of REDD-friendly legislation, regulations, and budgets; achievement of good governance standards and targets by local governments; and demonstrations of critical capacity to implement REDD programs on the part of key institutions.

If REDD payments come only after reduced deforestation rates are realized, then intermediate financing to reward and facilitate strategic milestones could be provided in various ways. Among these are GoI pre-financing (to be recouped eventually from REDD payments), donor funding, and private investment based on anticipated future returns from REDD payments. Investments might be facilitated by a REDD futures market or financed with REDD bonds issued by GoI or district governments.[59]

Trust funds and revenue-sharing between regions with high and low levels of current REDD payments could be used to even out year-to-year fluctuations in deforestation rates and consequent payments. Trust funds might be built up from a portion of REDD payments together with other, local PES schemes in addition to carbon payments.

[59] Note that a REDD futures index and bond ratings would provide progress indicators and would reward good performance in advance of full implementation.

5. FOREST GOVERNANCE AND THE IMPLEMENTATION OF REDD

5.1 Introduction

Governance is the method or system by which an institution is managed. In terms of contemporary approaches to government this includes the rules, processes and behavior that affect the way power is exercised. In this context governance is particularly concerned with *openness, participation, accountability, effectiveness and coherence.*[60]

Good governance is a necessary condition to enable sustainable forest management, including the formulation and implementation of consistent forestry policies and practices. Conversely, poor governance makes forest management problematic and contributes to failures of policy and performance that have failed to check high rates of deforestation and forest degradation.

This chapter is concerned with the integrity and acountability of government and how transparency mechanisms enabling openness and participation foster outcomes which benefit the governed and provide a foundation for the REDD supply chain.

5.2 Why Is Governance Important for REDD?

Good governance is important for REDD because the quality of the carbon units which the supply chain delivers will be influenced by buyers' confidence in future performance. Even with poor forest governance, wood and other products can be extracted and sold, as shown by illegal logging. However, selling credits for avoided deforestation requires reducing risk to ensure permanence, low leakage, and other conditions, which are less tangible and need to be taken on trust.

Particularly in the preliminary stages of preparing for REDD, confidence-building measures will be important to attract political and financial support, and governance improvements will be among the most visible and important confidence-building measures. Later, as REDD is fully implemented and is expected to deliver a sustainable *supply* of avoided deforestation credits, further improvements in governance will help to maintain investor confidence, safeguard the value and integrity of REDD payments, and enable REDD strategies to perform as intended to reduce deforestation.

Good governance will support REDD in three ways. It will help to:

- Reduce deforestation by improving the effectiveness of government policies and institutions, including forest management agencies and law enforcement;
- Create incentives for better forest management and remove perverse incentives that drive deforestation for private gain at the expense of the public good;
- Safeguard REDD payments against corruption and elite capture by ensuring that payment mechanisms and the financial institutions that govern them are capable, accountable, and free from undue political influence.

[60] European Union, 2001.

As a country which strives to implement good governance, Indonesia's successes will contribute to the quality of the carbon credits which it offers to the market and will assist it in gaining premium prices in relation to other countries whose record is not as strong.

5.2 Concepts: State of Knowledge and Best Practice

Governance measures for REDD include actions to address problems within the forestry sector as well as more wide-ranging and systemic issues arising from beyond the forest sector. Sector-specific problems are being addressed through the Forest Law Enforcement and Governance (FLEG) process, where the Ministry of Forestry is playing a leading role. Systemic governance issues are dealt with in broader efforts, across the whole of government and civil society, to fight corruption and improve government effectiveness through institutional reform.

5.2.1 Defining Good Forest Governance

Good governance is characterized by the following attributes that contribute to a well managed forest estate and the broader public good[61]:

- Legitimacy of forest governance regimes in the eyes of the governed;
- Consensus on fundamental principles and norms, with scope for constructive criticism and debate;
- Transparency and accountability on the part of those in authority;
- Predictability sufficient to enable long-term investment and planning;
- Legal certainty and the expectation that rights will be fairly protected;
- Law enforcement and adjudication free from corruption and improper political influence;
- Assurance of quality and delivery of results in line with good management principles;
- Low tolerance of administrative corruption and a competent forestry bureaucracy.

Corruption is both a symptom and a cause of poor governance.[62] A poorly governed state, lacking in accountability, allows corruption to flourish. Corrupt practices, in turn, can further distort policies and laws, weaken public institutions and undermine their legitimacy. Corruption occurs in all countries, but it tends to be more problematic in emerging democracies and transition economies (that is, in societies moving from authoritarian government and more centrally controlled economies to those with more open political systems and freer markets). Corruption also occurs more frequently in some sectors than others, with forestry being one that is particularly vulnerable.[63]

State capture where the actions of individuals or interest groups influence the formation of laws, regulations, statutes, and other government policies to their own advantage is a driver of forest corruption, especially where large revenue flows and weak governance give rise to *rent-seeking* behavior. Even when institutions are strong, the presence of high rents unleashes powerful incentives for those in government to weaken the institutions that constrain rent capture.[64]

[61] Adapted from Daniel Kaufman, 2003.

[62] The discussion of governance and corruption draws primarily on N. Kishor and R. Damania, 2007

[63] This vulnerability stems in part from the dispersed nature of forestry operations, which makes oversight difficult, and the relatively low entry costs compared to the high returns that can be earned from logging, which encourages rent-seeking—that is, the taking of excessive profits.

[64] For more on "state capture," see Hellman, J.S., G. Jones, D. Kaufmann, and M. Schankerman, 2000. State capture poses risks for REDD by distorting policies and incentives to unduly benefit particular private interest groups (Peskett and Harkin, 2007).

In a number of Asian countries, forests have fallen prey to state capture particularly during timber booms[65] by dismantling the legal and regulatory mechanisms that had previously served to protect the forests and its inhabitants… and insulated the forestry bureaucracy from political interference.

Typically, efforts to combat corruption rely too much on improving enforcement through deterrence, suppression, and monitoring and not enough on other dimensions of governance, including the provisions of incentives and rewards, which provide the administrators with an alternative pathway to their better interests. The following interventions are recommended to combat corruption and improve forest governance:[66]

- Reduce demand for illegal timber, for example through corporate codes of conduct and legality standards.
- Increase timber supplies, including both the overall supply through improved management and the supply of certified wood from legal sources to meet the growing demand for such products.
- Improve rent capture by government through the application of "proper forest resource accounting and forest valuation systems."
- Increase transparency and detection to deter and expose corruption.
- Increase accountability of forest managers and government agencies.
- Enact legislative and regulatory reforms that streamline and simplify taxes and rules to make accounting and fees easier to administer, more transparent, and more difficult to evade. Reforms also need to recognize in law traditional rights of forest access.
- Reform institutions to improve their capacity, provide incentives that reward good performance and deter corruption, and separate technical forest management functions from law enforcement.

5.2.2 The Accountability Framework.

A broad approach to good governance puts accountablity at its centre.[67] The so-called *accountability framework* focuses on the obligations of those given authority to conduct the business of government (called "agents") to those responsible for oversight of the agents (called "*principals"*). In a democracy, the people are ultimately responsible for choosing the government through elections and for the policies that are made and carried out for the public good. Elected offcials are therefore accountable to the public. Elected officials oversee the agencies of government charged with formulating and implementing policy, and these in turn supervise lower-level agents who carry out the specific activities of government.

Transparency is a key requirement for effective oversight and accountability at every level. Without it the public and their elected representatives cannot know what government agencies are doing. Various institutions in civil society including the media and academia, play important intermediary roles in gathering, interpreting, and disseminating information to the public. They also champion and advocate the interests and aspirations of particular groups and the general public to policy-makers. In the context of REDD, transparency and accountability are important to enable buyers and sellers of

[65] M. L. Ross, 2001
[66] Kishor and Damania (2007)
[67] World Bank, 2004.

carbon credits to enter into efficient transactions with confidence. They are also important to build support for REDD among stakeholders and the general public.

5.2.3 Governance at National and Sub-National Levels.

While accountability and other principles of good governance apply at all levels of government, it is also important to differentiate the roles and responsibilities of various institutions across sectors and at different levels of government. Generally, institutions at higher levels of governance are more effective at establishing common systems, standards, and regulatory frameworks; providing oversight to ensure quality and compliance at lower levels; and protecting rights and enforcing laws and regulations at all levels.

In the context of REDD, these will include agencies responsible at the national level for setting forest policies, laws and regulations; for national development planning including cross-sectoral coordination; for environmental policies and regulations; for law enforcement and adjudication; for budget allocation and financial regulation and oversight. Civil society organizations, the media, and the private sector will also play important roles in national-level governance as well as in linking national and sub-national actors and institutions through their local branches and affiliations. Some new institutions or new roles for existing ones will also be developed specifically for REDD: forest monitoring and carbon accounting; REDD project accreditation; and supervision of REDD payments.

Institutions at lower levels are better placed to manage resources or respond directly to the needs of resource users; to establish and enforce local rules for resource management and governance, including tenure; and to resolve local disputes. As noted elsewhere in this report, regional and local-level institutions play an immediate and direct role in dealing with most of the proximate causes of deforestation--illegal logging, encroachment, illegal and quasi-legal logging and land-clearing), so it is important that they be given the capacity, authority, and flexibility to do so, with proper oversight and support from national authorities.

Since most environmental problems (such as deforestation and degradation) have complex causes acting at different levels, governance solutions can benefit from institutional arrangements that link actors and decision-makers at multiple levels. Groups and institutions at different levels—local, landscape, regional, national and beyond—each have a degree of autonomy to exercise authority within a specified geographic area, but each is linked to others that provide information, oversight, higher-level authority, and other functions. Some units are general-purpose governments or communities, while others are specialized agencies, private associations, or corporations.

Local forest users in such hierarchical or nested systems of governance have some authority to make and enforce rules, especially for their members. They are backed up by higher-level authorities who protect users' rights, enforce laws, and provide oversight. Because no one approach or set of rules will necessarily be the best in all local situations, local units are encouraged to experiment and adapt to their circumstances within broader framework. Higher-level institutions can help with information sharing among the local units and provide scientific and technical support through research, extension, and basic education.

The following principles, expressed as questions to guide decision-making, can help formulate policies that encourage robust governance of natural resources[68]:

[68] Ostrum E., 2005 (particularly Chapter 9)

1. How can we better define the boundaries of this resource, and of the individuals who are using it, so as to make clear who is authorized to harvest and where harvesting is authorized?

2. How can we clarify the relationship between the benefits received and the contributions to the costs of sustaining this system?

3. How can we enhance the participation of those involved in making key decisions about this system?

4. Who is monitoring this system and do they face appropriate incentives given the challenge of monitoring?

5. What are the sanctions we are authorizing and can they be adjusted so that someone who makes an error or a small rule infraction is sufficiently warned so as to ensure longer-term compliance without our trying to impose unrealistic sanctions?

6. What local and regional mechanisms exist to resolve conflicts arising over `the use of this resource?

7. Are there functional and creative efforts by local appropriators to craft effective stewardship mechanisms for local resources that should be recognized?

8. How can a sustainable, multiple-layer, polycentric system be created that is dynamic, adaptive, and effective?

Robust forest governance is undermined by attempting to impose a uniform solution to a wide variety of problems in different circumstances instead of enabling participants to experiment, learn, and adapt. Threats can also arise from corruption and other opportunistic behavior, especially where external funding is plentiful and relatively unrestricted, and from the lack of large-scale institutional arrangements to support monitoring, information-sharing, and conflict resolution.

Local governments can assist initiatives that build institutions such as watershed councils, community-based natural resource management bodies. However, they need models of how such institutions work as well as help with facilitation, especially to engage local community groups. Political encouragement is also important, both from above (national government) in the form of policies and incentives, and from below, in the form of vocal support from constituents.

Facilitation and demonstration of models can be done by NGOs, research institutions, and private firms such as those engaged in certification. A consortium of several such organizations with complementary skills and networks can draw on a wider range of models and resources, and a consortium can form the basis for building robust, multi-stakeholder, multi-level forest governance institutions.

A good communications strategy is important to disseminate information about the applicability of potential models and to give voice to constituents' needs and aspirations.[69]

Decentralized decision-making for REDD management also requires dedicated research to uncover and explain the relevant drivers and how they operate in different areas, including research on economic and other incentives, institutional constraints, and human-environment interactions. The

[69] A useful methodology for communications strategies to drive adoption and replication of successful models is the "magnification" approach developed and implemented by Aid Environment and WWF.

results of this research can be used to guide adaptive management of REDD interventions and to learn how to design better REDD projects.

5.3 The Situation In Indonesia

The Government of Indonesia has acknowledged that a history of high deforestation and forest degradation rates are a consequence of inadequate forest governance, and the Ministry of Forestry has moved to address the issue explicitly through its long term strategic plan. The government also recognizes that illegal activities which impact on forests also derive from broader governance issues. These are pervasive or systemic problems that go beyond the sector, such as high levels of corruption and elite capture, ambiguous and conflicting laws and regulations, and poor performance of public institutions. Financial policies and incentives favoring sustainable forest management and the intrinsic environmental services of forest ecosystems will contribute to international buyers' perceptions of the quality of Indonesian REDD credits.

Recognizing the need for a multi-sector approach to improving governance, the Government of Indonesia has made the fight against corruption in all sectors a top priority, as demonstrated by the work of the independent Anti-Corruption Commission (KPK) and the special Anti-Corruption Court. Indonesia now has a law against money laundering (UU25/2003), which is the first in the world that allows the proceeds of illegal logging to be investigated and used in prosecution. As a result of anti-corruption efforts there has been a major wave of prosecutions against illegal activities in many sectors, including forestry. The State Ministry for Administrative Reforms announced an ambitious goal to apply a nationwide system of good governance at the local government level by 2008.

5.3.1 Legitimacy of Forest Governance.

The Indonesian constitution gives the state broad authority over forests and forest land but at the same time recognizes customary rights and use of forests, although subordinate to national interests. In the last decade, the legitimacy of state institutions has been strengthened and rebuilt on democratic principles.

The legitimacy of the current system of forest governance is now contested in two arenas:

- In the ongoing debate over how far decentralized authority should empower local governments to regulate forest use and forest-related income; and,
- In the efforts by local communities and their supporters in civil society to assert and defend customary claims to forests and forest land.[70]

Both are important for REDD. Local governments in Indonesia are asking about the share of decision-making authority and revenues they can expect from REDD, and in some cases (notably Aceh and Papua) provincial policies for REDD are being formulated. Those who speak on behalf of local communities are raising questions about the equity of REDD benefits in the context of forest tenure and rights to forest carbon. New REDD policies and regulatory reforms are expected to address these questions.

5. 3.2 Consensus on Principles and Norms.

During the last 40 years, nearly 2,000 cases of conflict affecting some 600,000 households over more than 10 million hectares of forest land have been documented in Indonesia.[71] A significant cause of

[70] Contreras and Fay (2005)
[71] Galudra et al (2006).

these conflicts has been dispute of functional forest zoning under the TGHK and conflicts are likely to continue until the TGHK system is reviewed and a new and real consensus reached with forest-edge and enclave communities.

The most commonly debated policies concerning conflict over forest land focus on:

- How much authority should be devolved by the Ministry of Forestry to province and districts government;
- The rights and responsibilities of local communities with forest-dependent livelihoods;
- The role of the military and police in legal and illegal forestry enterprises; and
- The balance between enforcement or incentive approaches in dealing with forest crime and corruption.

REDD will benefit from reduction and resolution of conflicts because conflict undermines the rule of law, drives deforestation, and compounds political risk. Each of these factors is likely to impinge on the quality of the carbon credits on international markets and affect price.

5. 3.3 Transparency and Accountability.

The 2003 World Bank investigation into corruption in Indonesia pointed to the need for greater transparency in the forest sector particularly in licensing and disclosure of accurate information on area and quality of forest cover, official forest boundaries, and reforestation fund planning.

New remote sensing technologies and worldwide news coverage have brought rapid change to information management as real-time public access is now available to events such as land-clearing fires, deforestation, and illegal logging. Remote sensing now provides the basis for the new forest monitoring and assessment system (FOMAS/FRIS).

Transparency will contribute to the efficiency of REDD markets by providing buyers and sellers with timely, accurate and accessible information; the proper functioning of markets by providing regulators with the information they need to oversee transactions; and general improved governance by constraining opportunities for corruption and elite capture.

5. 3.4 Predictability.

Predictability is of special importance for REDD and potential investors in REDD schemes because of the relatively long time-frames (30 to 100 years) over which "permanent" reductions in deforestation and degradation must be sustained. Unpredictable governance will result in higher risk and, therefore, lower prices for forest carbon. Further clarity is required concerning the devolution of responsibilities for management decisions over forests. A factor contributing to low predictability is the continuation of many pieces of legislation which are inconsistent or ambiguous making the legal framework for management decisions in the forest sector difficult to understand.

5. 3.5 Legal Certainty and Forest Land Tenure.

State sovereignty over virtually all forest land was asserted in the Basic Forestry Law of 1967 and reaffirmed in act 41/1999. The need for better local management and pressure for democracy and decentralization have encouraged opportunities for community-based forest management, including locally managed production to feed forest-based industry. Reforms such as the "Joint Forestry Management Approach" in Java have begun to provide local communities with greater forest access and benefits[72]. More can be done to clarify and recognize the rights of local people under customary law and resolve the competing claims of more recently settled migrants.

[72] Burns 2004; Contreras and Fay 2005; Peluso 1992

The remaining challenges facing in the forest land tenure include:

- Confusion about what legal rights to land can be established or held, by whom, and by what administrative and legal procedures;
- Vulnerability of existing non-formal and formal tenure arrangements, especially those under customary (*adat*) law, to legal and illegal challenges including through violent conflict;
- Complicated and sometimes contradictory regulations governing land ownership and use together with a lack of consistency and transparency in their enforcement;
- Institutional weakness and conflicting or unclear jurisdiction on the part of agencies charged with governing forest land tenure.[73]

The Ministry of Forestry's initiatives to legally strengthen community access to customary land under designations such as "village forest", "community forest" and HTR are designed to promote an interested management presence on land that has become *de facto* open access where communities have not had the legal authority or means to prevent outsiders entering the forest. These initiatives should combat the tendency for local residents to collaborate with others to exploit resources illegally rather than lose all access. The outcome for REDD will be an expanded legal framework for community level involvement in REDD projects and greater confidence in the market about the permanence of the REDD credits

5. 3.6 Forest Crime and Law Enforcement.

Forest crime is a threat to governance as it undermines the rule of law, exacerbates social conflict, and threatens sustainable forest management The prevention, detection, and suppression of forest crimes continue to be hampered by corruption in the justice system at each step from criminal detection and investigation, through case preparation and prosecution, to adjudication and appeal. The sheer number and complexity of overlapping, inconsistent, and contradictory regulations in the forest sector provide ample opportunity for administrative corruption, as officials either sell their services as brokers to navigate the bureaucratic tangle or else take bribes to circumvent it.

Since 2005 the Indonesian government has been undertaking a comprehensive program to curb illegal logging under the umbrella of the Forest Law Enforcement National Strategy (FLENS). In addition, Presidential Instruction (INPRES 4/2005) directs 18 government bodies as well as local government officials to cooperate in action to eradicate illegal logging. Subsequent to the INPRES a number of high profile illegal operators have been arrested. As a deterrence to other forest criminals these actions are expected to continue to be effective in reducing illegal logging further improving the country's capacity to generate REDD credits and to promote its credentials as a reliable international partner in carbon markets..

5.4 Challenges To Achieving Governance Readiness

The initiatives under FLEG represent significant progress towards increased transparency and accountability, improved law enforcement, and bringing forest-based industries into balance with sustainable wood supplies. There are additional actions proposed in this section to further improve forest governance, reduce corruption, and contribute to the success of REDD strategies. They are grouped under categories concerned with the need to build confidence among stakeholders and the potential markets; to strengthen accountability; to be able to safeguard the markets and payment distribution mechanisms; to reform specific government institutional practices and to build a broad

[73] These problems are by no means mutually exclusive. On the contrary, they overlap and aggravate one another. For example, politically weak institutions can do little to resolve conflicts arising from conflicting laws and regulations.

constituency of interested REDD stakeholders to provide the external checks and balances that every management system requires.

Many of the recommendations are explicitly or implicitly contained within the Ministry of Forestry Long Term Development Plan 2006-2025; and could be tested by incorporating them into REDD demonstration projects.

5.4.1 Building Confidence and Readiness

1. Implement the Ministry of Forestry's disclosure policy and invite public review of the maps and information prepared by the FOMAS project and advanced to FRIS and NCAS. . Field test the policy in REDD demonstration projects.
2. Activate the national case-tracking system within the Ministry of Forestry in coordination with police and prosecutors. Build case-tracking into the management of REDD demonstration projects with links to the national system and local enforcement efforts.
3. Launch a high-level, inter-agency *strike force* under Presidential authority to investigate and prosecute top ringleaders and financiers of illegal logging and associated crimes through joint efforts of the Attorney General's Office, National Police, Ministry of Forestry, Ministry of Defense and the Coordinating Ministry for Politics, Law, and Security.

5.4.2 Strengthening Accountability

1. Require disclosure and divestiture by cabinet members of forest-related financial holdings and other business interests to reduce the potential for political interference and conflict-of-interest.
2. Eliminate the use of forestry revenues as a source of funding for political parties or, require disclosure of such funding to ensure REDD financial flows and the allocation of forest concessions are independent of political interference and elite capture.
3. Make corporate and local government eligibility to participate in REDD conditional on meeting specific standards and indicators of good governance.
4. Consider a public declaration of principles and practices that politicians, political parties, and business associations should commit to in support of good forest governance and achievement of REDD objectives.
5. Seek compliance through incentives and enforcement with policies and regulations requiring forest concession holders to implement plans which reduce timber theft and environmental damage from fire and logging practices.

5.4.3 Safeguarding REDD Payments and Markets

1. Consider adopting national financial sector regulations requiring enhanced due diligence procedures for Politically Exposed Persons (PEPs) to curtail the financial activities of PEPs involved in forest-related corruption and crime.
2. Enhance cooperation with Indonesia's major international partners in forest trade and investment to strengthen FLEG reforms, such as improved wood tracking and control of log smuggling and money laundering, and link them to regulation of REDD markets.
3. Tackle judicial reform and anti-corruption efforts in the justice system through case-tracking and public scrutiny, consumer action, and institutional capacity-building to improve accountability and performance, especially at the district level.

4. Work with civil society organizations such as the Partnership for Governance Reform to build broad public support for judicial reform and accountability.

5.4.4 Reforming the Institutions of Government

There are two areas where institutional reform would be valuable to the optimum implementation of REDD post 2012. . Both could be accommodate in REDD Demonstration Activities..

1. Consider the formation of a National Forest Land Tenure Commission, possibly under the National Forestry Council (DKN), to resolve land tenure disputes and underlying legal and institutional conflicts.

   The purpose of the commission would be to provide an independent agency, operating which could set and supervise national standards and legal principles including local institutions and customary laws. Much of the work could be decentralized to local, multi-stakeholder institutions under the overall supervision of the National Commission, Various mechanisms and approaches for joint management responsibility and governance, including community forests, forest co-management, conservation concessions, "carbon" concessions, could be piloted in selected areas under REDD schemes, with special attention to the allocation, ownership and regulation of forest carbon rights.

2. Consider a civil society partnership involving community organisations and private enterprise to assist government in achieving the divesture of military forest-sector holdings

   The military is already required by law to divest itself of all business holdings and interests, many of which are in the forest sector. The role of the partnership might include facilitating the transfer of assets to benefit small and medium-sized forest-related industries, particularly those supporting the REDD system such as intensification of plantations on non-forest or degraded land, emerging markets for environmental services, and reforestation initiatives including community-based CDM. This activity could be coordinated with the ongoing program to restructure and revitalize the forest industry[74.]

In line with reforms in other parts of government such as the Ministry of Finance, the Ministry of Forestry may undertake institutional and management reforms to bring its organizational structure, systems, and budgets into line with principles of good institutional governance, forest economics and ecology. Such reforms could include:

- results-oriented management,
- clarification of lines of responsibility and accountability,
- transparency in decision-making such as on concession awards, development of professional career-tracks, improvement of internal and external communications and data-sharing ; and
- appropriate decentralization of management authority to landscape-scale forest management units (KPH) linking the Ministry of Forestry with local government and local private and community stakeholders.

5.4.5 Building REDD Constituencies and Incentives

Because governance of REDD and the forest-sector are affected by broader, systemic governance problems, efforts to improve forest governance with increased transparency and accountability need to reach the broadest possible constituency of stakeholders, and these stakeholders need to be informed,

[74] Ministry of Forestry (2007).

motivated, and empowered to take appropriate action. There is value in focusing on the broadest possible constituency. The benefits of REDD should be distributed widely to offer incentives for good forest governance to a diverse group of stakeholders.

1. One option for building such *REDD constituencies* is through investment in forest-based environmental services, especially water and watersheds, that benefit potentially large numbers of people and engage multiple levels of communities and agencies in co-management to reduce deforestation.

2. Another option is to channel REDD payments to poverty-reduction programs that benefit the general public, such as health, education, agricultural development, and land-tenure reform. These services may or may not directly contribute to reducing deforestation, but their improvement will reinforce public perception of the value of preserved forest carbon in a tangible and real way.

There are potential roles in such schemes for many sectors and levels of government to receive and manage REDD funds in return for tangible improvements in governance and service delivery that contribute directly or indirectly to avoided deforestation.[75]

5.5 Conclusions

Good forest governance is important for REDD in order to build and sustain confidence among stakeholders and investors; to achieve reductions in deforestation and degradation through effective strategies; and to ensure equitable and transparent distribution of benefits from REDD.

Key governance issues for REDD in Indonesia are

- Transparency of forest-related information, land allocation, and revenues;
- Public accountability for policies and management decisions;
- Rule of law and legal certainty in a consistent framework of laws, policies, and regulations at all levels of government;
- Secure and equitable rights to forest utilization, including land tenure;
- Fair distribution of benefits and protection of REDD payments from corruption and elite capture.

The implementation of REDD in Indonesia will lead to greater stakeholder involvement than ever before in the management of Indonesia's forests. This broad involvement can be a great asset to the government in achieving forest sustainability as the benefits of maintaining the fullest range of goods and services that forests provide will be assisted by the new market opportunities. Greater community support for government and stronger community opposition to destructive practices can be expected. However, in order for these strengths to be optimized there will also need to be a new and greater level of awareness among stakeholders of the legal and administrative framework within which forest governance occurs.

Because governance of REDD and the forest-sector are affected by broader, systemic governance problems, efforts to improve forest governance with increased transparency and accountability need to reach the broadest possible constituency of stakeholders, and these stakeholders need to be informed,

[75] Peskett and Harkin (2007) suggest that "REDD payments could be used to implement a range of policies and other measures, depending on the drivers of deforestation the stakeholders involved and whether the avoided deforestation is planned or unplanned" .

motivated, and empowered to take appropriate action. There is value in focusing on the broadest possible constituency, by distributing the benefits of REDD widely, so as to offer incentives for good forest governance to a diverse group of stakeholders who can support REDD within and beyond the forest sector.

Initiatives under FLEG contribute to increased transparency and accountability, improved law enforcement, and bringing forest-based industries into balance with sustainable wood supplies. But substantial research is required for the value of these and related initiatives to be fully realized. They need to be communicated to forestry personnel involved in the field, who are typically insufficiently educated and trained; and they need to be communicated to the public, whose level of awareness of forest management laws, regulations and policies is low. A number of additional actions are proposed in this chapter to further improve forest governance, reduce corruption, and contribute to the success of REDD strategies. Frequently the implementation of these strategies will require preliminary and parallel research and investigation to ensure their effectiveness. A review and recommendations detailing proposals for forest governance research has been recently prepared by the Ministry of Forestry's Forest Research and Development agency (FORDA)[76]

[76] The FORDA 2008 Draft Report to the World Bank is entitled: *Forest Governance and Corruption in Indonesia*

6. TESTING FOR THE FUTURE: A FRAMEWORK FOR THE IDENTIFICATION OF DEMONSTRATION ACTIVITIES PROJECTS AND INVESTMENT FOR REDD IN INDONESIA

6.1 Introduction

The purpose of this chapter is to present a framework under which Indonesia could test and develop its capacity to enter into, and to optimize international financial support in favor of a sustainable forest management regime which preserves its forest carbon resources.

By preserving its forest carbon resources Indonesia will achieve its declared commitment to being a leader among tropical rainforest countries in climate change mitigation. It will also preserve the ecological processes in the landscape which regulate water, maintain soil and soil fertility and conserve biodiversity. By reversing trends in the loss of forest vegetation and forest degradation using the resources which REDD has the potential to provide, Indonesia will also preserve its capacity to support the millions of its population that live in and around forested environments. It can explore alternative development pathways that will provide economic opportunities to alleviate poverty and will provide for a cleaner and more healthy environment for those impoverished people who are most exposed to the impacts of air and water pollution.

The chapter addresses three issues:

- Principles for determining Demonstration Activities
- Achieving *Readiness* for a post-2012 compliance market; and
- Investing in strategic forest sector reform for REDD

6.2 Principles for determining Demonstration Projects

6.2.1 The REDD Supply Chain and Demonstration Projects

The key principle around which these proposals for demonstration projects revolve is the need to test the challenges that go to producing tradable carbon credits. The demonstration projects must examine as their primary purpose how a REDD carbon credit supply chain will operate in a range of circumstances representing biophysical and administrative circumstances.

In order for a REDD scheme to result in payments for carbon units traded, there are a number of steps that must be fulfilled: These steps have been defined as the *Supply Chain* and consist of:

1. The establishment of a *Baseline*
2. Reductions in carbon emissions achieved against the Business as Usual scenario
3. Monitoring and verification of the reductions
4. The accounting of carbon trading units; and
5. The distribution of the payments from the market to the agencies responsible for achieving the tradable carbon credits.

Pilot projects should test how these steps can be undertaken in a way which results in tradable carbon credits under the range of circumstances which this large and complex country presents. The outcome of the demonstration projects will determine:

- Where gaps may lie in information or capacity to obtain information;
- The practicality of implementing management options which reduce emissions in each of the forest use sectors from a technical and economic perspective;
- The practicality of implementing management options at different spatial and administrative scales;
- The quality and permanence of the carbon credits that can be achieved;
- Mechanisms which are just and transparent for the distribution of payments from the market transactions to the agencies (government, business, community or NGO) responsible for the resource management changes.

Because all steps in the supply chain need to be realised in order to achieve an effective REDD trading scheme, pilot activities should be designed which incorporate all stages. For example there is no point in testing precision of monitoring unless it is linked to the evaluation of carbon credits. The *Supply Chain* represents an integrated system which needs to be applied to demonstration projects, and to the subsequent full implementation of a REDD scheme.

It would be wise if guidelines for selecting proposals for demonstration activities included a clause which emphasized the need for proposals to be holistic and mindful of testing the application of all stages in the supply chain.COP-13 decision also provide indicative guidance for Demonstrationa Activities, which also need to be taken into account.

6.2.2 The Scale of Demonstration Projects

Indonesia has adopted a decentralized approach to government within its unitary state. Responsibilities for forest and land use have been variously devolved according to law. In the case of forest resources, responsibilities are shared by all levels of government, although some aspects of local management responsibilities remain vague. The Minister retains a high level of administrative power. The approach known as the *Padu Serasi* has been followed between the national government and the province governments to achieve harmonization in relation to land uses on and off the forest estate, to bring into line spatial planning under the Spatial Planning Act, decentralized to local government, and spatial planning in relation to the allocation of forest use zones under the Forestry Act.

Based on an analysis of responsibilities of the three strata of government, Demonstration Projects should be undertaken at four levels of potential future activity:

- National (for example with land management units managed from national government, e.g., National Parks;)
- Province (Forestry activities in areas that cross districts; e.g., , TAHURA)
- District (Forestry activities that occur within a District (HPH, HTI, Community Forest Area, oil palm estate)
- Project (for example with forest management units such as individual HPH, HTI, Estate crop plantation, or community based HTR.

The view of the IFCA analysis is that the minimum spatial scale should coincide with the administrative level of the District in order to reduce the inherent difficulties posed by *leakage* and *additionality*.

At all levels, the new concept of the KPH as described in the PP6/2006 and amended in PP3/2008, offers the most integrated administrative unit for forest management on the Forest Estate.

A key consideration in relation to the selection and design of the demonstration activities will be the need for areas to be mapped and monitored at large scale, preferably 1:50 000 to maximum 1: 100 000, thus putting them at a scale comparable to the spatial planning of the District level of local government.

There is a also a significant issue in relation to the organisation of ***Payment Distribution Mechanisms*** because there is debate as to whether these should be managed at national, sub-national or project level. This analysis follows IPCC Guidelines and assumes that the monitoring of reduced emissions and subsequent payment distributions to contributing projects will be coordinated nationally.

When the REDD carbon market is fully active it will be the responsibility of the national facility monitoring emission reductions, to recommend compensation through payment distribution to project implementing agents across the country. As projects will not sell their specific carbon emission reduction credits directly into the market under the compliance framework, the task to be faced by the management agency is to determine, on the basis of national emissions savings, what proportion of the income received from the market should go to each project, based on its size, effectiveness and form (e.g., savings in an oil palm project in Riau may be compensated according to different formula than a natural production forest in Maluku).

The pilot phase leading to 2012 provides the opportunity for these formulae to be determined through demonstration activities which have direct relationships with buyers under national coordination guidelines, . These objectives should be stipulated in the implementing regulations for REDD Demonstrationa Activities . This period is an opportunity for project proponents from all industry sectors and at all geographical scales to volunteer forest industry management practices to save measurable emission reduction credits for which they will be guaranteed reimbursement, possibly through fund sources, in return for lessons which can be used to establish national management principles for each forest industry. There would be opportunity in negotiation between the Ministry of Forestry and the proponents to agree a set of project management guidelines which applied the strategic reforms recommended for each forest sector in Chapter 4. After the implementation of a systematically chosen set of demonstration projects it should be possible for national management guidelines to be defined, which could then be appended to permits issued nationally to individual projects. Providing the projects were then implemented according to permit guidelines each could then expect reimbursement on the basis of a statistically established rate of emissions saving.

This national **compliance** based system would run independently and parallel to the **voluntary** market which will always be market-based and where remuneration of projects will result from direct trading between project sellers and buyers, a situation which will not occur in the compliance market.

6.2.3 Selection of Demonstration Activities

Based upon the above considerations, proposals for specific REDD demonstration activities could be received from any sectoral agency and from any level of government as well as from civil society. Following the principle that the project should be testing issues associated with implementing the REDD supply chain and the subsequent distribution of payments as well relevant COP-13 decision on demonstration activites, successful proposals could, typically require partnerships among stakeholders representing all the steps in the process.

Reduction of emissions, the sale of the credits and the distribution of the resulting finance involves action at many levels of scale from local to national and from one forest land management sector to

another. Demonstration Activities could therefore be identified which had a primary focus on issues of scale, as well as on issues associated with individual sectors.

Projects selection needs to encompass the range of forest sector uses, viz.:

- Protected Areas, including conservation reserves (*Kawasan Konservasi)* and national parks under *National* jurisdiction; TAHURA under Province jurisdiction; and protection forest (*Hutan Lindung*) under District jurisdiction.
- Natural Production Forests
- Industrial Plantation Forests, especially for the production of pulp for paper production; and
- Oil Palm Plantation

Selection of geographical locations should also allow for the testing of circumstances in forests that are on:

- Peat soils and
- Mineral Soils

With respect to peat soils sites with deep peat should be given priority. These include 12 districts in the provinces of NAD, Riau, Jambi, East Kalimantan, Central Kalimantan and Papua.

To determine the effectiveness of managing encroachment through alternative business development/ community development, site selection needs to encompass locations (Districts) where the access to the forest by neighbouring communities is:

- High
- Low

Site selection needs to consider locations where REDD benefits can contribute to a broad range of social and infrastructure improvements, demonstrating the capacity of the new carbon mechanism to address poverty alleviation and opportunity growth, in return for forest stewardship, not encroachment.

Site selection should also consider potential cooperation from forest industries willing to implement improved management through, for example, adopting Reduced Impact Logging (RIL); international benchmark plantation operation; and certification, as a means of testing opportunity cost incentives.

How these locations are distributed across the country will require detailed attention to maximize lessons learnt while minimizing confounding influences making the lessons difficult to generalize.

One very significant aspect in relation to this issue is to determine how to deal with the issue of cross-subsidization between regions to take into account the risk of *perverse incentives*. Perverse incentives would apply if a regional government were to decide – after following a land use decision making process which had permitted extensive deforestation and forest degradation - to follow an economic development which conserved all remaining forest. The change in land use would reflect a large number of REDD credits because of the marked reduction against BAU. Conversely where a regional government had followed a development pathways which had retained extensive areas of forest, adoption of REDD would result in a relatively smaller number of credits because the land use decisions would not produce large gains against BAU.

In terms of a national screening of approved demonstration activities , an objective should therefore be the inclusion of regions which:

- Had a high forest cover; but high rates of deforestation;

- Had high forest cover and low rates of deforestion; and
- Had lower forest cover but low rates of deforestation.

The fourth option: low forest cover and high rates of deforestation, is unlikely to be a significant concern in practice.

6.3 Achieving Readiness: building the REDD infrastructure

The period 2008-2012 leading to the conclusion of the term of the Kyoto Protocol is to be used to develop the capacity within tropical rainforest countries to be early participants in a new REDD Compliance Carbon Market.

Readiness requires that participating countries have established their capability to produce tradable carbon credits by applying the supply chain steps. Specifically, *readiness* requires:

- that there is an established emissions baseline against which the carbon units can be accounted;
- there is a independent monitoring system available which delivers annual activity and emission statements with low uncertainty;
- that there is an understanding and commitment to the steps that can be taken to reduce deforestation and forest degradation through management change; and
- that there is a system in place to account for carbon credits, to arrange for their sale, and to distribute the income in support of continuing forest management improvements to the responsible stakeholders.

The recommended approach for optimizing the country's status in relation to *readiness* is a program of demonstration activities , which could in part and as necessary, draw upon international donor grants which have become available for REDD applications.

Grant programs directed towards achieving compliance by 2012 could, for example, draw upon a range of multilateral and bilateral contributions under such instruments as the World Bank coordinated Forest Carbon Partnership Facility (FCPF) and pledged support from bilateral donors including Australia, the United Kingdom,Germany and UN-REDD and other potential sources. Projects appropriately funded under grants could focus on establishing an emission baseline and building monitoring capacity and in developing the organizational infrastructure for managing the market and distribution of payments. Other issues appropriately piloted under a program would seek to clarify relationships between local government non-forest land use and land use planning and the national forest estate, issues of tenure and the engagement of civil society, and the implementation of effective regulatory controls.

Table 24 presents a preliminary estimate of the costs of a REDD-related technical assistance program covering the period 2008 – 2012, with potential sources of funding and technical expertise. The costs of this grants' driven assistance are in the order of $7.5 million.

Table 24. Estimated costs of a 5-Year REDD Technical Assistance Grant Program 2008-2012

Activity	Proposed scope of activities and potential sources of expertise	Estimated Cost US$ millions	Potential sources of funding and support
Negotiation and finalisation of a Base Line	Further analysis and development of data already developed by MOF with assistance of experts from WRI, Winrock International, Max Plank, Woods Hole, University of Dakota, CATIE, and CIFOR. Consultation process (workshops and stakeholder facilitation.) Knowledge management. Multi-stakeholder workshops led by an IFCA Team Leader plus representatives of government, MOF, private sector, industry & NGO's. Policy researchers, supported by International expertise (Local community and Indigenous people input crucial).	0. 5 1.0	MOF plus other GOI funding sources World Bank; FCPF; Multilateral e.g plus bilateral technical assistance Norway. Other donors
Development and Establishment of a Monitoring and Verification System	Will build on ongoing FOMAS initiatives and relevant satellite monitoring and ground-truthing experiences being tested in Brazil and elsewhere. Will continue to draw on ongoing expertise being provided by, e.g., WRI, Winrock, South Dakota University, TNC, World Bank, FCPC, (Additional expertise can be anticipated from experts financed by the various bilateral donors who will be supporting the development and practical testing of these monitoring systems	2.5	MOF Funding already pledged by AUS AID, DFID, GTZ, Japan, Norway? Other donors? FCPF
REDD Markets and Financing, Negotiation and testing of Payment Distribution Mechanisms Identification of carbon marketing opportunities, Buyers and Sellers) Development of equitable payment and distribution mechanisms with	Further exploration and negotiation of whether an international REDD financial mechanism will be market or fund-based.? Whether the credits in any market-based system will be fungible with other credits in the regulatory international carbon markets, or traded under a separate protocol? Will test on a pilot- scale options such as whether national governments or sub-national entities; (for example Provincial/District government, villages, communities or private companies), are to be credited or given incentives as sellers in the market.	1.0	MOF Provincial/ Local Governments DFID/GTZ/and other bilateral donors FCPF

special reference to those that will benefit low income families. Financial mechanisms that will create financial and economic incentives that could create an enabling environment for bringing about changes in historical approaches to forest land use management by leading private sector companies .			
Spatial Forest Land Use Planning	A clear and secure spatial baseline is essential to long-term investments in forest carbon, in particular to prevent leakage and guarantee permanence. REDD payments resulting from such investments may be mobilized to offset the opportunity costs of re-designating forest land, to re-focus plantation development on degraded and bare land, and to provide incentives for sustainable management. This will necessitate the development of a secure spatial baseline; Accordingly pilot activities will collect, improve and review spatial data and analysis of existing and proposed permits, forest and concession boundaries, community lands (through community mapping), forest cover, peat lands, rainfall and soils.	1.0	MOF CIFOR/ICRAF; FAO Other sources Bilaterals Other donors FCPF
Clarifying rights, roles and responsibilities for REDD implementation,	Demonstration activities should seek to clarify the rights, roles and responsibilities for REDD implementation, through learning by doing. Key issues for resolution include clarification of land tenure and forest management rights, governing revenue distribution and the respective roles of national and local government, civil society, the private sector and independent entities in carbon trading, regulation and fund management. Pilots will test alternative arrangements, spanning both sub-national and national schemes.	0.5	MOF assisted by experts from e.g., CIFOR ICRAF, FAO Other sources Bilaterals Other donors? The Forest Carbon Partnership Facility

Forest Law Enforcement and Governance:	Pilot activities are being planned that will aim to: Strengthen illegal logging interdiction, including work to tackle barriers and bottlenecks in existing enforcement Encourage timber industry companies voluntarily to adopt and timber theft measures. Improve official supervision (monitoring and verification) of logging operations in the Production Forest zone Engage local police forces Support incentive programs for engaging local communities in containment of illegal-logging Step up use of "Strike forces .Involve GOI Anti Money Laundering and corruption agencies. Develop local capacity for outcome oriented independent monitoring of private sector company forest harvesting and management practices.(e.g., LEI, FSC) Improve financial due diligence processes to ensure more effective analysis by industry in advance of mill expansions of wood availability and to discourage investment in carbon-negative pulp industry projects. Strengthen GOI capacity for implementation of Environmental Impact Assessments.	1.0	MOF assisted by experts from e.g., CIFOR/ICRAF,FAO Other sources Bilaterals Other donors The Forest Carbon Partnership Facility
Total Costs		**7.5**	

Note : Activities and costs may change along with Indonesia government undertaking on devloping REDD architecture, adjusted with the progress inside and outside negotiations.

6.4 Developing an investment program to reduce deforestation

Regardless of the scale or location of the approved demonstration projects, the production of REDD credits will require a change in the way forest land or a forest industry sector is managed compared to BAU practice.

Recommendations for strategic forest management strategies that would reduce emissions below BAU levels have been presented in Chapter 4 and reviewed in relation to the Ministry of Forestry Long Term Development Plan 2006-2025. These recommendations form the basis for a potential investment program that would achieve many of the objectives of the Long Term Development Plan, while also significantly reducing deforestation and forest degradation.

The formal definition of *Readiness* does not require a country to be implementing forest management strategies prior to 2012. Nevertheless, a Demonstration Project Activities which will test Indonesia's capacity to implement the REDD carbon credit supply chain will require a selective start to strategically changing forest management in parallel with the construction of the defined infrastructure for *readiness.*

Many of the strategic management recommendations contained in this document can be implemented in the short to medium term. However, most will also require a longer period to be fully incorporated and consolidated so that they can begin to produce the returns on investment which will make them a sustainable part of the way forests are regarded and used.

As the analysis in Chapter 4 has shown, a national REDD framework does not fundamentally change GOI's approach to SFM, or to the proposals already being considered for restructuring and expansion of the forest industries. However, the potential magnitude of a combination of climate change-related financial instruments, and the prospect of substantial future REDD carbon credits could provide the financial capacity, for the first time in a decade, for the GOI to implement critical policy reforms as well as changes to practical and professional practices in government and civil society that have been long recognized. Key reforms include clarification of land use in forest lands, the need for more transparent forest concession allocation processes and the need for independent monitoring of forest harvesting and management. As the Long Term Development Plan makes clear it is also essential to the future of forestry as a sector that the shortfall in professional staff is addressed.

Such reforms will contribute incentives which skeptical local communities require if they are to engage as partners in sustainable forest management with government. They will also contribute to the enabling environment necessary to attract responsible private sector investment.

Table 25 presents an analysis of issues and a preliminary estimation of the scale of investment which could effectively drive an initial five year phase of a long term (15 year) integrated forest conservation and development program. The investment figures contained in this analysis represent scales of magnitude and are based on professional experience and consensus.

The estimated total investment of approximately $ 4 billion targets land use changes and improved forest governance in production forests, development of pulpwood, timber and oil palm plantations on degraded and non-forest lands, improved management of protected areas, forested watersheds and of peat lands.

Confidence for national investment (APPN) in forestry sector reforms will be enhanced by participation in the UNFCCC process leading to the post-Kyoto agreements, as returns on investment are expected to be available through the development of at least an interim, fund-based REDD carbon market operating during the Readiness Phase. However, in addition to national investment, bi-lateral technical assistance is complemented by strong international commitments to assist rainforest countries through multi-lateral loan programs, such as the World Bank coordinated Forest Investment Programme(FIP) which has been established specifically to address issues related to forest management and climate change. The FIP could provide concessional funding in the order of $ 500 million to supplement national government financed components. Over a 5-year period this level of international investment would represent an additional annual injection of about 20% of the national forestry budget.

A REDD Investment Program will be complementary to already planned private sector investments that are targeting the restructuring of Indonesia's timber, plywood, manufacture, wood based panel, pulp paper and oil palm industries.

Table 25. Potential components of an initial 5-Year Phase of a REDD-Related Investment Program covering the period 2008 -2012

Activity	Estimated Cost US$ million	Potential sources of funding
Implementation of strategies for more effective conservation and management of Protected Areas Focus might include: • Review of national conservation plan • Completion of gazettal • Investment in training and professional capacity • Development of effective management of protected areas, including protection forest in upper watersheds. • Development of collaborative management arrangements and ecosystem restoration • Implementation of REDD demonstration projects involving a range of protected area types with different jurisdictions	500	MOF Local Govt. Resources Leading Conservation agencies Bilateral Donors The World Bank (Forest Investment Programme)
Implementation of strategies for more effective management of Production Forests Focus might include: • FLEG related initiatives to contain illegal logging (e.g. *Strike Force* proposals) • Voluntary adoption by private sector companies of anti timber theft measures. • Outcome based independent certification • Investment in Reduced Impact Logging • In collaboration with the MOF and BRIK establishment. of a 1 million ha compensatory fast growing timber plantation resource by small holders	1000	MOF Private sector companies Bilateral donors World Bank (FIP)
Strategies for forest harvesting and management to supply the requirements of the pulp and paper industry The objective would be to achieve a rapid transition away from harvesting native mixed tropical hardwoods towards increased dependence on community and small holder owned pulpwood plantations grown on degraded forest and agricultural lands (e.g. *alang alang* grasslands), with a target of 1 million ha of plantations over 5 years.	1,000	Private sector companies MOF Local govt. resources Bilateral donors The (FIP)
Strategies for supplying the requirements of the oil	500	Private sector

palm industry. The strategy for moving away from rain forest conversion for oil palm is presented in Chapter 3. It includes provision for establishment by small holders of 1 million hectares of new plantations on degraded forest and agricultural lands. There is also a fundamental requirement to rationalize the relationships between forest land, especially the functional zone of convertible forest HPK and non-forest land subject to land use decisions and spatial planning by regional governments.		companies MOF Local govt. resources Bilateral donors World Bank (FIP)
Testing strategies for restoration of Peatlands MOF proposals envisage building on the success being achieved through a continuing Water Resource Management Program. The most effective strategies already tested include effective drainage design and fire control, but also require a review of land management responsibilities between local and national governments in relation to forest and non-forest land on peats.	500	Ministry of Agriculture Public Work The World Bank (Forest Investment Programme)
Enhancement of the capacity of community groups, including adat communities to engage in forest management through REDD activities . The main objectives would be to improve quality of life of low income families, living in or adjacent to natural forests, to protect the rights of forest dependent indigenous peoples and local communities, and to reduce illegal logging. Support might be channeled through an extension of successful models such as the Kecamatan Development Scheme and the National Program for Community Empowerment (PPMNM).	500	MOFr Ministry of Home Affairs
Total	**4000**	

The total level of investment proposed in Table 25 is substantial. However, the levels of investment come into perspective when seen in relation to the potential earning from an international trade in the REDD carbon resource. During the last five years annual deforestation in Indonesia has been in the order of 740,000 hectares equivalent to about 300 million tonnes of $C0_2$. This provides a huge potential for mobilizing income from REDD carbon credits through improved forest management. A figure of $1.2 billion per year may be achieved by reducing illegal logging by 50 % by 2012; effectively implementing existing legislation requiring SFM; and removing industrial plantations and oil palm conversions away from further harvesting and conversion of native forests.

The proposed REDD Investment Program would address the main underlying causes of deforestation and degradation in Indonesia and enhance the prospects of attracting substantial carbon credits. By giving special emphasis to mobilizing the potential of REDD related investments to address rural poverty alleviation, it will help to create sustainable forest related employment and encourage community involvement in control and management of forest resources. By supporting parallel GOI programs in forested areas for upgrading rural education,

health and other social services and by encouraging adoption of more productive agro- forestry farming systems the Program will help to create alternative livelihoods and reduce dependency in many rural families on income from illegal logging and conversion of forest vegetation to non sustainable agriculture. Preliminary calculations suggest that REDD related investment programs and carbon credits have the potential to benefit many of Indonesia's 10 million low income families who live in or adjacent to forests.

The Investment Program is expected to lead to a significant increase in the area of independently certified and sustainably managed Production Forests, to improved access to environmentally sensitive overseas markets and to more effective protection and management of Protected Areas and Peatlands. It will help to attract the private sector investment that will be needed to achieve GOI's plans for doubling the capacity of the pulp industry to at least 12 million tonnes (i.e., twice today's capacity) based entirely on plantation-based raw material. It is anticipated that a significant proportion of future pulpwood fibre will be derived from small holders .Export earnings from such an industry could feasibly be increased from their present level of $ 4 billion to perhaps $8 billion a year.

The Program would also help to attract private sector investment needed to achieve GOI's plans for a doubling in size of the oil palm industry that will have shifted to total dependency on oil palm plantations established on non-forest and non-peat lands. GOI envisages long term possibilities by 2015 for oil palm exports to increase from their present level of $3.75 billion to an estimated $7 billion. By supporting the establishment of fast growing timber plantations and parallel programs for upgrading the technical efficiency and quality of small – medium scale joinery, furniture and other wood based industrial products and by helping SME's to access both domestic and overseas markets, it will support GOI's objective of enhancing the potential of such industries to create rural employment and to contribute to economic growth.

The key feature that must underpin any investment program of the magnitude proposed is partnership.

Partnership has to happen among multilateral and bilateral donors to ensure that the sources of funding most appropriately fit the projects which they support. Partnership and collaboration must also happen among Indonesian agencies. Successful implementation of the proposed investment program will necessitate collaboration between the Ministries of Forestry, Industry, Home Affairs, Agriculture and, Environment. It will also need to engage representatives of local communities, conservation agencies, leading forest industrial and oil palm companies, and forest industrial associations. The National Forest Council (DKN) could play a key role in ensuring the establishment of such a multi-stakeholder framework for implementation and monitoring of progress of the Investment Program. The MOF has already taken a lead by creating the collaborative IFCA framework.

The main risks of program failure are political constraints to implementation of the essential forest land tenure and other policy reforms needed to engage local communities, difficulties of controlling the negative impacts of currently widespread illegal logging and difficulties GOI faces in curtailing the influence of powerful private sector timber company vested interests that have been benefiting from short term " Cut and Get Out " timber harvesting practices and the inconsistent effectiveness of regulation in forest operations.

ANNEX 1: GLOSSARY

Additionality: The principle that only those projects that would not have happened without financial investment in carbon should be counted for carbon credits.

Afforestation: The direct human-induced conversion of land that has not been forested for a period of at least 50 years to forested land through planting, seeding and/or the human-induced promotion of natural regeneration. In the context of the Kyoto Protocol, as stipulated by the Marrakesh Accords, cf. paragraph 1 of the Annex to draft decision -/CMP.1 (Land use, land-use change and forestry) contained in document FCCC/CP/2001/13/Add.1, p.58.

Annex 1 Countries: The 36 industrialized countries and economies in transition listed in Annex 1 of the UNFCCC. Their responsibilities under the Convention are various, and include a non-binding commitment to reducing their GHG emissions to 1990 levels by the year 2000.

Annex B Countries: The 39 emissions-capped industrialized countries and economies in transition listed in Annex B of the Kyoto Protocol. Legally-binding emission reduction obligations for Annex B countries range from an 8% decrease to a 10% increase on 1990 levels by the first commitment period of the Protocol, 2008–2012.

Anthropogenic: from the consequences of human activities. In the IPCC Guidelines, anthropogenic emissions are distinguished from natural emissions. Many of the greenhouse gases are also emitted naturally. It is only the increments resulting from human activities additional to natural emissions that may be perturbing natural balances. In the LULUCF-GPG, all emissions and removals of managed lands are seen as anthropogenic.

Arithmetic Mean, Statistical definition: The sum of the values divided by the number of values.

Assigned Amount Unit (AAU): A tradable unit, equivalent to one metric ton of CO2 emissions, based on an Annex 1 country's assigned carbon emissions goal under the Kyoto Protocol. AAUs are used to quantify emissions reductions for the purpose of buying and selling credits between Annex 1 countries.

Baseline: A baseline is a projection of emissions from deforestation and degradation and serves as a reference for measuring reductions in emissions based on a designated reference year or period. It is a function of projected area change combined with the corresponding change in carbon stocks and will need to be negotiated among Parties.

Baseline scenario: A scenario that reasonably represents the anthropogenic emissions by sources of greenhouse gases (GHG) that would occur in the absence of the proposed project activity.

Biomass: In its most simple form the term measures the *living* weight of organic matter in the ecosystem. Under this definition it is concerned with differences in the conversion of energy into biological material. In relation to the concept of Forest Biomass and specifically the use of the term in the context of stored carbon for REDD, the definition becomes more problematical as it assists in the understanding of pathways and rates of energy conversion which change the quantity and location of carbon storage.

For this purpose biomass is defined as the dried weight of all organic material both living and dead, in the ecosystem e.g., trees, crops, grasses, tree litter, roots etc. Forest Biomass includes:

- ***Aboveground Biomass***: All biomass in trees and non-tree vegetation above the soil including stems, branches, bark, fruits, and foliage. It also includes standing dead trees and stumps.
- ***Belowground Biomass*:** All biomass associated with energy storage, and pathways of cycling and exchange in the rhizosphere. This includes leaf and wood litter, root stock and roots.

Biomass Accumulation Rates: Net accumulation of biomass produced by the sum of all increments minus the sum of all losses. When carbon accumulation rate is used, only one further conversion step is applied: i.e., the use of 50% carbon content in dry matter (default value).

Cancellation: see Retirement.

Canopy Cover: The percentage of the ground covered by a vertical projection of the outermost perimeter of the natural spread of the foliage of plants. Cannot exceed 100%. (Also called crown closure) Same as crown cover.

Cap-and-Trade: A Cap and Trade system involves trading of emission allowances, where the total allowance is strictly limited or 'capped'. Trading occurs when an entity has excess allowances, either through actions taken or improvements made, and sells them to an entity requiring allowances because of growth in emissions or an inability to make cost-effective reductions.

Carbon Dioxide (CO_2): This greenhouse gas is the largest contributor to man-made climate change. Emitted from fossil fuel burning and deforestation.

Carbon Dioxide Equivalent (CO_2e): A measure of the global warming potential of a particular greenhouse gas compared to that of carbon dioxide. One unit of a gas with a CO_2e rating of 21, for example, would have the warming effect of 21 units of carbon dioxide emissions (over a time frame of 100 years).

Carbon Budget: The balance of the exchanges of carbon between carbon pools or between one specific loop (e.g., atmosphere – biosphere) of the carbon cycle. The examination of the budget of a pool or reservoir will provide information whether it is acting as a source or a sink.

Carbon Cycle: All parts (pools) and fluxes of carbon; usually thought of as a series of the four main pools of carbon interconnected by pathways of exchange. The four global pools are atmosphere, biosphere, oceans and sediments. Carbon exchanges among pools by chemical, physical and biological processes.

Carbon Flux: Transfer of carbon from one pool to another in units of measurement of mass per unit of area and time (e.g., tons C ha-1 yr-1).

Carbon Pool: The reservoir containing carbon.

Carbon Stock: The quantity of carbon in a pool.

Carbon Stock Change: The carbon stock in a pool can change due to the difference between additions of carbon and losses of carbon. When the losses are larger than the additions, the carbon stock becomes smaller and thus the pool acts as a source to the atmosphere; when the losses are smaller than the additions, the pools acts as a sink to the atmosphere.

Closed Forests: Forests characterized by canopy cover higher than 40%.

Carbon Dioxide Equivalent: A measure used to compare different greenhouse gases based on their global warming potentials (GWPs). The GWPs are calculated as the ratio of the radiative forcing of one kilogram greenhouse gas emitted to the atmosphere to that from one kilogram CO2 over a period of time (usually 100 years).

CBD: Convention on Biological Diversity

CDM: Clean Development Mechanism

Certification: Certification is the written assurance by a third party that, during a specified time period, a project activity achieved the reductions in anthropogenic emissions by sources of greenhouse gases (GHG) as verified.

Certified Emissions Reductions (CERs): Tradable units issued by the UN through the Clean Development Mechanism for emission reduction projects in developing countries. Each CER represents one metric ton of carbon emissions reduction. CERs can be used by Annex 1 countries to meet their emissions goals under the Kyoto Protocol.

CIFOR: Centre for International Forestry Research

Clean Development Mechanism (CDM): A provision of the Kyoto Protocol that allows developed countries (Annex 1) to offset their emissions by funding emissions-reduction projects in developing countries (non-Annex 1).

CO_2: Carbon Dioxide

COP: Conference of the Parties

Compliance Market: The market for carbon credits (specifically CERs, EUAs, AAUs, and ERUs) used to reach emissions targets under the Kyoto Protocol or the EU ETS. Also called the Regulated Market.

Conference of Parties (COP): The meeting of parties to the United Nations Framework Convention on Climate Change.

Crediting Period: The period a mitigation project can generate offsets.

Deforestation: The direct, human-induced conversion of forest vegetation to non-forest vegetation This definition means a reduction in crown cover from above the threshold of what is defined as *forest* to below this threshold. Deforestation causes a change in land cover and in land use. Common changes include: conversion of forests to annual cropland, conversion to perennial plants (oil palm, shrubs), conversion to slash-and-burn (shifting cultivation) lands, and conversion to urban lands or other human infrastructure.

This definition closely follows that used by the UNFCCC and the Kyoto Protocol and may be adopted for REDD. It differs only in making clear the distinction that *forest* specifies a *vegetation type* and is distinct from *forest land* which in Indonesia is used to designate a *land type for administrative purposes*. For example in Indonesia *forest land* is administered under the Forestry Act but includes areas which have been deforested.

Please see the IPCC *Report on Definitions and Methodological Options to Inventory Emissions from Direct Human-induced Degradation of Forests and Devegetation of Other Vegetation Types* for a more thorough discussion.

Degradation: *A direct, human-induced, long-term loss (persisting for X years or more) or at least Y% of forest carbon stocks [and forest values] since time T and not qualifying as deforestation*. Degradation represents a measurable, sustained, human-induced decrease in canopy cover, with measured cover remaining above the threshold for definition of forest.

Indonesia has yet to decide on the value for the three parameters: X,Y and T, to meet its national circumstances. Estimates of degraded areas will be affected by the definition of a *degraded forest*. The IPCC presents five potential definitions for degradation:

(1) A direct human-induced loss of forest values (particularly carbon), likely to be characterized by a reduction of tree crown cover. Routine management from which crown cover will recover within the normal cycle of forest management operations is not included.

(2) Changes within the forests that negatively affect the structure or function of the stand and site, and thereby lower the capacity to supply products and/or services.

(3) Direct human-induced activity that leads to a long-term reduction in forest carbon stocks.

(4) The long-term reduction of the overall potential supply of benefits from the forest, which includes carbon, wood, biodiversity and any other product or service.

(5) The overuse or poor management of forests that leads to long-term reduced biomass density (carbon stocks).

Designated Operational Entity (DOE): An independent entity, accredited by the CDM Executive Board, which validates CDM project activities, and verifies and certifies emission reductions generated by such projects.

Devegetation: See Deforestation

Disturbances: Processes that reduce or redistribute carbon stocks among pools in terrestrial ecosystems.

Double-Counting: Double counting occurs when a carbon emissions reduction is counted toward multiple offsetting goals or targets (voluntary or regulated). An example would be if an energy efficiency project sold voluntarily credits to business owners, and the same project was counted toward meeting a national emissions reduction target.

EU: European Union

Emission Factor: A coefficient that relates the activity data to the amount of chemical compound which is the source of later emissions. Emission factors are often based on a sample of measurement data, averaged to develop a representative rate of emission for a given activity level under a given set of operating conditions.

Emission Reductions (ERs): The measurable reduction of release of greenhouse gases into the atmosphere from a specified activity or over a specified area, and a specified period of time.

Emission Reduction Units (ERUs): A tradable unit, equivalent to one metric ton of CO2 emissions, generated by a Joint Implementation project and used to quantify emissions reductions for the purpose of buying and selling credits between Annex 1 countries under the Kyoto Protocol.

Emissions Trading: A provision of the Kyoto Protocol that allows Annex 1 countries to trade emissions reduction credits in order to comply with their Kyoto-assigned targets. This system allows countries to pay and take credit for emissions reduction projects in developing countries where the cost of these projects may be lower, thus ensuring that overall emissions are lessened in the most cost-elective manner.

Environmental Integrity: Is used to express the fact that offsets need to be real, not double counted and additional in order to deliver the desired GHG benefits. The term should not be confused with "secondary environmental benefits" which is used for the added benefits an offset projects can have (e.g. air pollution reduction and protection of biodiversity.)

European Union Allowance (EUA): Tradable emission credits from the European Union Emissions Trading Scheme. Each allowance carries the right to emit one ton of carbon dioxide.

European Union Emissions Trading Scheme (EU ETS): The EU ETS is a greenhouse gas emissions trading scheme which aims to limit emissions by imposing progressively lower limits on power plants and other sources of greenhouse gases. The scheme consists of two phases: Phase (2005-07) and Phase II (2008-12).

Ex-ante: In terms of carbon offsets, ex-ante refers to reductions that are planned or forecasted but have not yet been achieved. The exact quantities of the reductions are therefore uncertain.

Ex-post: As opposed to ex-ante offsets, ex-post reductions have already occurred and their quantities are certain.

FAO: Food and Agriculture Organization of the United Nations

FMU: Forest Management Unit

Forests: Forests under the CDM are classified as a minimum area of land of 0.05 – 1.0 hectares with tree crown cover (or equivalent stocking level) of more than 10 – 30 per cent with trees with the potential to reach a minimum height of 2 – 5 meters at maturity in situ. A forest may consist either of closed forest formations where trees of various story and undergrowth cover a high portion of the ground or open forest. Young natural stands and all plantations which have yet to reach a crown density of 10 – 30 per cent or tree height of 2 – 5 meters are included under forest, as are areas normally forming part of the forest area which are temporarily non-stocked as a result of human intervention such as harvesting or natural causes but which are expected to revert to forest. [Source: FCCC/CP/2001/13/Add.1]

Forest Inventory: System for measuring the extent, quantity and condition of a forest, usually by sampling.

Forest land: *a* category that includes all land with woody vegetation consistent with thresholds used to define Forest Land in the national greenhouse gas inventory. It also includes systems with a

vegetation structure that does not, but in situ could potentially reach, the threshold values used by a country to define the Forest Land category. For the purpose of the Kyoto Protocol, it was determined through the Marrakech Accords that Parties should select a single value of crown area, tree height and area to define forests within their national boundaries. Selection must be from within the following ranges, with the understanding that young stands that have not yet reached the necessary cover or height are included as forest:

- Forest area: 0.05 to 1 ha (Indonesia decided on 0.25 ha)
- Potential to reach a minimum height at maturity in situ of 2-5 m (Indonesia decided on 5 m).
- Tree crown cover (or equivalent stocking level): 10 to 30 % (Indonesia decided on >30%)

Under this definition a forest can contain anything from 10% to 100% tree cover; it is only when cover falls below the minimum crown cover that it designated as *non-forest*. However, if this is only a temporary change, such as for timber harvest with regeneration expected, the land remains in the forest classification.

Forest Management: A system of practices for stewardship and use of forest land aimed at fulfilling relevant ecological (including biological diversity), economic and social functions of the forest in a sustainable manner.

Forward Crediting: Sale of ex-ante credits. At contract closure the buyer pays for and receives a certain number of offsets for emissions reductions or sequestration that will occur in the future.

Forward Delivery: At contract closure the buyer pays the purchase price for a certain number of offsets that have yet to be produced. The offsets will be delivered to the buyer once they have been realized and verified.

FRIS : Forest Resource Information System
Good Practice, Inventory definition: Good Practice is a set of procedures intended to ensure that greenhouse gas inventories are accurate in the sense that they are systematically neither over nor underestimates so far as can be judged, and that uncertainties are reduced so far as possible. Good Practice covers choice of estimation methods appropriate to national circumstances, quality assurance and quality control at the national level, quantification of uncertainties and data archiving and reporting to promote transparency.

Greenhouse Gases (GHGs): Gases that cause climate change. The GHGs covered under the Kyoto Protocol are: CO2, CH4, N2O, HFCs, PFCs, and SF6.

ha: Hectare

Host Country: The country where is an emission reduction project is physically located.

IPCC **:** Intergovernmental Panel on Climate Change
IPF **:** Intergovernmental Panel on Forests
ITTA **:** International Timber Trade Agreement
ITTC **:** International Tropical Timber Council
ITTO **:** International Tropical Timber Organization
IUCN **:** World Conservation Union

IUPJL License *(Izin Usaha Pemanfaatan Jasa Lingkungan*): permits that grant the right for individuals or companies to utilize the environmental services of Production and Protection forests.. Duration of the IUPJL is now 30 years.

Internal rate of return (IRR): The annual return that would make the present value of future cash flows from an investment (including its residual market value) equals the current market price of the investment. In other words, the discount rate at which an investment has zero net present value.

Issuance: Issuing a specified quantity of CERs for a project activity into the pending account of the CDM EB into the CDM registry.

Joint Implementation (JI): A provision of the Kyoto Protocol that allows those in Annex 1 (developed) countries to undertake projects in other Annex 1 (developed or transitional) countries (as opposed to those undertaken in non-Annex 1 countries through the CDM).

KP: Kyoto Protocol

Kyoto Mechanisms: The three flexibility mechanisms that may be used by Annex I Parties to the Kyoto Protocol to fulfill their commitments through emissions trading (Art. 17). Those are the Joint Implementation (JI, Art. 6), Clean Development Mechanism (CDM, Art. 12) and trading of Assigned Amount Units (AAUs).

Kyoto Protocol: An international treaty that requires participating countries to reduce their emissions by 5 percent below 1990 levels by 2012. The Protocol, developed in 1997, is administered by the Secretariat of the UN Framework Convention on Climate Change.

LULUCF: Land use, Land-use change and forestry

Land Use: The type of activity being carried out on a unit of land. In GPG-LULUCF this term is used for the broad land-use categories. It is recognized that these land categories are a mixture of land cover (e.g,, Forest, Grassland, Wetlands) and land use (e.g., Cropland Settlements) classes.

Leakage: Leakage is defined as the net change of anthropogenic emissions by sources of greenhouse gases (GHG) which occurs outside the project boundary, and which is measurable and attributable to the project activity.

m: Meter

MA: Marrakech Accord

Managed Forest: All forests subject to some kind of human interactions (notably commercial management, harvest of industrial round-wood (logs) and fuel wood, production and use of wood commodities, and forest managed for amenity value or environmental protection if specified by the country), with defined geographical boundaries.

Millennium Development Goals (MDGs): The MDGs commit the international community to an expanded vision of development, one that vigorously promotes human development as the key to sustaining social and economic progress in all countries, and recognizes the importance of creating a global partnership for development. The goals have been commonly accepted as a framework for measuring development progress.

NCAS : national Carbon accounting System

NTFP: Non-Timber Forest Products

Non-Annex 1 Countries: A group of mostly developing countries which have not been assigned emissions targets under the Kyoto Protocol and which are recognized by the UNFCCC as being especially vulnerable to the elects of climate change.

Pool/Carbon Pool: A reservoir. A system which has the capacity to accumulate or release carbon. Examples of carbon pools are forest biomass, wood products, soils and the atmosphere. The units are mass.

Primary market: The exchange of emission reductions, offsets, or allowances between buyer and seller where the seller is the originator of the supply and where the product has not been traded more than once.

Project boundary: The project boundary shall encompass all anthropogenic emissions by sources of greenhouse gases (GHG) under the control of the project participants that are significant and reasonably attributable to the project activity.

Project Design Document (PDD): A project specific document required under the CDM rules which will enable the Operational Entity to determine whether the project (i) has been approved by the parties involved in a project, (ii) would result in reductions of greenhouse gas emissions that are additional, (iii) has an appropriate baseline and monitoring plan.

Prompt Delivery: At contract closure the buyer pays the purchase price for a certain number of offsets which have already been realized and are delivered to the buyer promptly.

Reforestation: Direct human-induced conversion of non-forested land to forested land through planting, seeding and/or the human-induced promotion of natural regeneration, on land that was forested but that has been converted to non-forested land. For the first commitment period, reforestation activities will be limited to reforestation occurring on those lands that did not contain forest on 31 December 1989.

Registration: The formal acceptance by the CDM Executive Board of a validated project as a CDM project activity.

Retirement: Retirement is a way of reducing overall emissions by purchasing carbon offsets and retiring them so that they may not be used to offset others' emissions. Retired credits can no longer be traded.

Revegetation: A direct human-induced activity to increase carbon stocks on sites through the establishment of vegetation that covers a minimum area of 0.05 hectares and does not meet the definitions of afforestation and reforestation contained here.

SBSTA: Subsidiary Body for Scientific and Technical Advice
SBSTTA : Subsidiary Body for Scientific, Technical and Technological Advice
SFM: Sustainable Forest Management

Secondary forest: Forests that have been impacted by human activities and are in a state of

regeneration.

Secondary Market: The exchange of emission reductions, offsets, or allowances between buyer and seller where the seller is not the originator of the supply and represents a secondary trade in the particular product.

Stakeholders: Stakeholders mean the public, including individuals, groups or communities elected, or likely to be elected, by the proposed project activity or actions leading to the implementation of such an activity.

Temporary Certified Emission Reductions (tCERs): A temporary certified emission reduction is a unit issued pursuant to Article 12 of the Kyoto Protocol for an Afforestation/Reforestation CDM project activity under the CDM, which expires at the end of the commitment period following the one during which it was issued. It is equal to one metric ton of carbon dioxide equivalent.

US **:** United States
UN **:** United Nations
UNEP **:** United Nations Environment Program
UNESCO **:** United Nations Educational, Scientific, and Cultural Organization
UNFCCC **:** United Nations Framework Convention for Climate Change
UNFF **:** United Nations Forum on Forests
USDA **:** United States Department of Agriculture
USFS **:** United States Forest Service

United Nations Framework Convention on Climate Change (UNFCCC): An international treaty, developed at the 1992 UN Conference on Environment and Development, which aims to combat climate change by reducing global greenhouse gas emissions. The original treaty was considered legally non-binding, but made provisions for future protocols, such as the Kyoto Protocol, to set mandatory emissions limits.

Validation, Inventory definition: Validation is the establishment of sound approach and foundation. In the context of emission inventories, validation involves checking to ensure that the inventory has been compiled correctly in line with reporting instructions and guidelines. It checks the internal consistency of the inventory. The legal use of validation is to give an official confirmation or approval of an act or product.

Validation: The assessment of a project's Project Design Document, which describes its design, including its baseline and monitoring plan, by an independent third party, before the implementation of the project against the requirements of a specific standard.

Verification: Provides an independent third party assessment of the expected or actual emission reductions of a particular abatement project.

Verification: Refers to the collection of activities and procedures that can be followed during the planning and development, or after completion of an inventory that can help to establish its reliability for the intended applications of that inventory. Typically, methods external to the inventory are used to check the truth of the inventory, including comparisons with estimates made by other bodies or with emission and uptake measurements determined from atmospheric concentrations or concentration gradients of these gases.

Verified or Voluntary Emissions Reductions (VERs): Reductions that, unlike CERs, are sold on the voluntary market. VERs is linked neither to the Kyoto Protocol nor to the EU ETS. VERs is sometimes referred to as Voluntary Emissions Reductions.

Voluntary Market: The non-regulated market for carbon credits (especially VERs) that operates independently from Kyoto and the EU ETS.

Voluntary Offsetting: Offsetting purchases made by individuals, businesses, and institutions that are not legally mandated.

WB: World Bank

WCMC: World Conservation Monitoring Centre

WFC: World Forestry Congress

WWF: World Wide Fund for Nature

ANNEX 2: BIBLIOGRAPHY

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ANNEX 3: A Proposed Forest classification system for assessing and monitoring changes in Indonesian forest cover for the purposes of REDD

				Year (depending data availability)		
			Land and forest categories	1990	…	
I			**FOREST AREA**			
A			**Production forest**			
	A1		***Natural Forest***			
		A1.1	*Non Disturbed*			
			Primary dry land forest			
			Primary swampy forest (incl. peat land)*			
			Primary mangrove forest			
		A1.2	*Disturbed Forest*			
			Secondary dry land forest			
			Secondary swampy forest (incl. peat land)			
			Secondary Primary mangrove forest			
		A1.3	*Non Forest Cover*			
	A2		***Plantation Forest***			
		A2.1	*Non Disturbed*			
		A2.2	*Disturbed*			
		A2.3	*Non forest cover*			
B			**Conservation Forest**			
	B1		***Natural Forest***			
		B1.1	*Non Disturbed*			
			Primary dry land forest			
			Primary swampy forest (incl. peat land)			
			Primary mangrove forest			
		B1.2	*Disturbed Forest*			
			Secondary dry land forest			
			Secondary swampy forest (incl. peat land)			
			Secondary Primary mangrove forest			
		B1.3	*Non Forest Cover*			
C			**Protection Forest**			
	C1		***Natural Forest***			
		C1.1	*Non Disturbed*			
			Primary dry land forest			
			Primary swampy forest (incl. peat land)			
			Primary mangrove forest			
		C1.2	*Disturbed Forest*			
			Secondary dry land forest			
			Secondary swampy forest (incl. peat land)			
			Secondary Primary mangrove forest			
		C1.3	*Non Forest Cover*			
D			**Conversion Forest**			
	D1		***Natural Forest***			
		D1.1	*Non Disturbed*			
			Primary dry land forest			
			Primary swampy forest (incl. peat land)			
			Primary mangrove forest			
		D1.2	*Disturbed Forest*			
			Secondary dry land forest			

			Secondary swampy forest (incl. peat land)			
			Secondary Primary mangrove forest			
		D1.3	*Non Forest Cover*			
II			**NON-FOREST AREA**			
E			**Forested APL (Area Penggunaan Lain)**			
	E1		***Natural Forest***			
		E1.1	*Non Disturbed*			
			Primary dry land forest			
			Primary swampy forest (incl. peat land)			
			Primary mangrove forest			
		E1.2	*Disturbed Forest*			
			Secondary dry land forest			
			Secondary swampy forest (incl. peat land)			
			Secondary Primary mangrove forest			

Note: If possible they can be separated between swampy and peat land forests. Further subdivision of each forest category is possible based on elevation (0-600 m; 600-1000 m; 1000-2000 m and > 2000m), and annual rainfall (<200 cm, 200-300 cm, 300-400cm and >400 cm) as suggested by WRI. Non-forest cover be subcategorized following the IPCC GPG i.e. grassland, settlement, crop land and other lands

ANNEX 4 : GOVERNANCE RESEARCH TO SUPPORT REDD

Forestry research programs can be strengthened to focus more on forest governance and corruption so as to better support science-based policy and decision-making. The following are some guidelines for a governance-oriented research program:

- Incorporate an action-oriented research program into forestry field programs and pilot projects so as to support a flexible, learning approach to problem-solving and adaptive management. For program strategies to achieve their objectives they will have to be robust and flexible enough to cope with uncertainty, complexity, and the changing behavior of agents as they respond in turn to those strategies.
- Build action research, adaptive management, and a learning approach into new and upgraded forest management units (KPH). As part of this approach help to strengthen the policy-making role of locally rooted, multi-level and multi-stakeholder management institutions, drawing on technical advice from appropriate research agencies.
- It is not enough to provide policy-makers with information; it must be communicated effectively and supported by political as well as scientific arguments. These should be addressed not only to the policy-makers themselves but to their constituents and relevant public-interest groups.

A scoping study of forest governance problems was conducted in 2007 by the Forest Research and Development Agency (FORDA) of the Ministry of Forestry with support from the World Bank in order to obtain the views of stakeholders and to formulate a research agenda that would support improved forest governance and policy-making.[77] The methods used included seminars, interviews, focus group discussions and workshops. The study focused on the following problems:

- Weak government control and vulnerability to state capture;
- Weaknesses in law enforcement and administrative corruption;
- Problems of institutional capacity;
- Supply chain weakness;
- Difficulties with governance indicators and benchmarks;
- Weaknesses of human resources.

Stakeholders pointed out numerous discrepancies between government policies and their implementation. The principles of good governance have never been formulated in the context of sustainable forest management in Indonesia and are often only associated loosely if at all with the number of laws and regulations produced, which are neither rooted in reality nor effective. Attempts to define and measure indicators of good governance are often hindered by a shortage of data. In addition, there is still no established procedure for evaluating good forest management; rather it is oriented mainly to mainly administrative matters.

[77] The information on FORDA's governance research program is drawn from the January, 2008, draft report to the World Bank on "Forest Governance and Corruption in Indonesia."

The following are some of the study's findings and recommendations for further research to be conducted by FORDA:

- Legal and Institutional Framework

  Overlapping laws and lack of coordination amongst government institutions have created conflict in forest management, weak law enforcement, and improper grants of authority. The interviews and workshops confirmed that there are numerous interventions from various parties in the process of policy making (i.e., state capture). Differences in understanding and interpretation of laws and regulations, such as in the case of Law 41/1999 and Law 32/2004, have caused conflict in the field between forest rangers, police, prosecutors, and the courts. In addition there is a gap in the understanding of sustainable forestry concepts between the government, NGOs, and communities.

  FORDA research in this area will focus on policy, land tenure, law enforcement, and the legal and political system. Issues particularly in need of attention are (1) socialization with local stakeholders of forest status and functions; (2) customary land rights and claims that may not have been accommodated by government policies; (3) effectiveness of law enforcement related to deforestation and illegal logging; (4) effectiveness of the judicial system to combat forest related crime; and (5) incentives for banks to stop and prevent any further financing of illegal logging. On land tenure, research is required on how government policy can better facilitate public access and community involvement in forest management, particularly to prevent illegal logging and deforestation. It is also recommended to pay attention to the sustainability and consistency of the efforts at community capacity building.

- Administration of Forest Production and Distribution

  Weak monitoring and weak law enforcement have encouraged over-exploitation, while lack of appropriate administrative systems and transparency has hindered the proper exercise of oversight and management controls. Recommendation is given for research related to accountability and effectiveness of forest concession establishment and management, incentives to support the continuation of regulations and policies, accountability and effectiveness related to timber distribution from logging areas to industry and on to consumers.

- Governance Standards, Norms, and Criteria

  Principles and guidelines of good governance in the context of sustainable forest management need to be developed and applied in Indonesia. FORDA will establish methods to determine key indicators, explore the perceptions of key parties on good forestry governance, experiment on determination of indicators on forest management, research monitoring on the implementation of good forest governance.

- Human Resources

  The performance of field staff is vulnerable to irregularities due to a number of pressures, including political pressure. Problems of irregularities in the field are closely related to the integrity of, and the failure to implement, the control and supervision system, while at the same time incentives and disincentives (where opportunities reward irregularities) continue to exist in the field. Opportunities are created by inconsistencies between central and local government laws and regulations, including technical problems of law enforcement and adjudication. Opportunity for manipulation occurs because of social pressure in the context of

endemic and entrenched corruption (a so-called "culture of corruption"). Moreover, leadership is failing to provide a good example, all echelons in the department fail to provide good examples in creating qualified human resources capacity, and in addition there are problems of low motivation caused by the lack of clarity of the regulations.

Starting from observations of actual staff performance under present field conditions with a view to finding and overcoming constraints, FORDA's research will focus on identifying and designing employment structures that actually match field requirements; placement of human resources based on career and position analysis including a display of good leadership; consistent incentives and disincentives. Particular attention will be paid to actions needed to reduce illegal logging and other proximate causes of deforestation and degradation.