REDD

Introductory Course on
Reducing Emissions from Deforestation
and Forest Degradation (REDD):

A Participant Resource Manual

April 2009

Editors:
Rane Cortez
The Nature Conservancy

Peter Stephen
IDSS Pty Ltd

CCBA The Climate, Community & Biodiversity Alliance
Rainforest Alliance
The Nature Conservancy Protecting nature. Preserving life.
WWF for a living planet
Conservation International
gtz

REDD

Introductory Course on Reducing Emissions from Deforestation and Forest Degradation (REDD):

A Participant Resource Manual

Editors:

Rane Cortez
The Nature Conservancy

Peter Stephen
IDSS Pty Ltd

About

Our Organizations

The Nature Conservancy: Founded in 1951, The Nature Conservancy is a non-profit 501(c)3 organization whose mission is to preserve the plants, animals, and natural communities that represent the diversity of life on Earth by protecting the lands and waters they need to survive. Headquartered in Virginia, the Conservancy employs over 3,500 staff working in chapters and programs in all 50 U.S. states and in more than 30 countries on six continents. To date, the Conservancy has protected more than 117 million acres of land and 5,000 miles of rivers worldwide, and we operate more than 100 marine conservation projects globally.

The Climate, Community and Biodiversity Alliance (CCBA) is a partnership between leading companies, NGOs and research institutes seeking to promote integrated solutions to land management around the world. With this goal in mind, the CCBA has developed voluntary standards to help design and identify land management projects that simultaneously minimize climate change, support sustainable development and conserve biodiversity.

Conservation International works in over 40 countries throughout Asia, Africa and Latin America, and is dedicated to protecting the Earth's biological diversity (www.conservation.org). CI believes that the Earth's natural heritage must be maintained if future generations are to thrive spiritually, culturally, and economically. Its mission is to conserve the Earth's living heritage – our global biodiversity – and to demonstrate that human societies are able to live harmoniously with nature.

GTZ: As an international cooperation enterprise for sustainable development with worldwide operations, the federally owned Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH supports the German Government in achieving its development-policy objectives. It provides viable, forward-looking solutions for political, economic, ecological and social development in a globalised world. Working under difficult conditions, GTZ promotes complex reforms and change processes. Its corporate objective is to improve people's living conditions on a sustainable basis.

The Rainforest Alliance works to conserve biodiversity and ensure sustainable livelihoods by transforming land-use practices, business practices and consumer behavior. Based in New York City, with offices throughout the United States and worldwide, the Rainforest Alliance works with people whose livelihoods depend on the land, helping them transform the way they grow food, harvest wood and host travelers. From large multinational corporations to small, community-based cooperatives, the organization involves businesses and consumers worldwide in its efforts to bring responsibly produced goods and services to a global marketplace where the demand for sustainability is growing steadily. The Rainforest Alliance sets standards for sustainability that conserve wildlife and wildlands and promote the well-being of workers and their communities. Farms and forestry enterprises that meet comprehensive criteria receive the Rainforest Alliance Certified™ seal. The Rainforest Alliance also works with tourism businesses, to help them succeed while leaving a small footprint on the environment and providing a boost to local economies.

World Wildlife Fund: Since its incorporation in 1961, World Wildlife Fund's mission has been the conservation of nature. Using the best available scientific knowledge and advancing that knowledge, the World Wildlife Fund works to preserve the diversity and abundance of life on Earth and the health of ecological systems by protecting natural areas and wild populations of plants and animals, including endangered species; promoting sustainable approaches to the use of renewable natural resources; and promoting more efficient use of resources and energy and the maximum reduction of pollution. The World Wildlife Fund is committed to reversing the degradation of our planet's natural environment and to building a future in which human needs are met in harmony with nature.

ACKNOWLEDGEMENTS

This manual is the result of a collaborative effort by experts in some of the leading organizations on conservation and forest carbon to draw upon our field-based knowledge and distill it into an easy-to-use set of training manuals on Reducing Emissions from Deforestation and Forest Degradation (REDD).

We are especially grateful to Peter Stephen at IDSS Pty Ltd. for bringing his training expertise and energy to the development of this manual.

We would also like to acknowledge the following individuals for their contributions to this document:

The Nature Conservancy

Rane Cortez, Research Associate
Lex Hovani, REDD Advisor
Bronson Griscom, Forest Carbon Scientist
Nikki Virgilio, Research Associate

Climate, Community and Biodiversity Alliance

Steve Panfil, Senior Manager
Joanna Durbin, Director

Conservation International

Mario Chacon, Training Manager, Climate Change Initiatives
Olaf Zerbock, Manager, Forest Carbon Projects
Celia Harvey, Vice President, Global Change and Ecosystem Services
Jonathan Philipsborn, Coordinator Land Use Strategies and Climate Change Initiatives
Stavros Papageorgiou, Manager, Forest Carbon Projects
Angel Parra, Technical Advisor, Forest Carbon Projects and REDD Initiatives
Pauline Moore, Manager - Carbon Finance and Economics
Susan Stone, Senior Advisor, Indigenous Policy and Practice, Indigenous and Traditional Peoples Program

German Technical Cooperation (GTZ)

Georg Buchholz, Indonesian-German Forests and Climate Change Programme and Principal Advisor Merang REDD Pilot Project

Rainforest Alliance

Jeff Hayward, Climate Initiative Manager

World Wildlife Fund

Steve Ruddell, Director, Forest Carbon Projects and Standards
Guenola Kahlert, Forests and Climate Officer

TABLE OF CONTENTS

List of Figures

List of Tables

List of Boxes

ACRONYMS

AAU	Assigned Amount Unit
CBA	Convention on Biological Diversity
CCBA	Convention on Biological Diversity
CCBA	Community Climate and Biodiversity Alliance
CCBS	Community Climate and Biodiversity Standards
CCX	Chicago Climate Exchange
CDM	Clean Development Mechanism
CERs	Certified Emission Reductions
CI	Conservation International
CIFOR	Centre for International Forestry Research
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide Equivalents
COP	Conference of Parties
CR	Compensated Reductions
ERs	Emission Reductions
ERUs	Emission Reduction Units
EU ETS	European Union Emissions Trading Scheme
FAO	Food and Agriculture Organization of the United Nations
FCPF	Forest-Carbon Partnership Facility (facilitated by the World Bank)
GHG	Greenhouse gas or greenhouse gases
GTZ	German Technical Corporation
IET	International Emissions Trading
IPCC	Intergovernmental Panel on Climate Change
IUNC	The World Conservation Union
JI	Joint Implementation
JRC	European Commission's Joint Research Centre
LULUCF	Land Use, Land Use Change, and Forestry
ODA	Official Development Assistance
PES	Payments for Environmental Services
PDD	Project Design Document
ppm	Parts per Million
RA	Rainforest Alliance
REDD	Reducing Emissions from Deforestation and Forest Degradation
RGGI	Regional Greenhouse Gas Initiative
SBSTA	Subsidiary Body for Scientific and Technological Advice
tCERs	Temporary Certified Emission Reductions
TNC	The Nature Conservancy
UNEP	United Nations Environment Program
UNFCC	United Nations Framework Convention on Climate Change
VERs	Verified or Voluntary Emissions Reductions
WRI	World Resources Institute
WWF	World Wildlife Fund

INTRODUCING THE RESOURCE MANUAL

Reducing **E**missions from **D**eforestation and forest **D**egradation (**REDD**) is a concept that has been gaining momentum in climate change policy negotiations at both the international and national levels. REDD was included in the Bali Roadmap of the UNFCCC; a number of government funds have been established to support REDD activities, such as the Australian Forest & Climate Initiative and the Norwegian government's fund; the World Bank has recently initiated its Forest Carbon Partnership Facility; and a number of developing countries have announced initiatives to address emissions from deforestation. At the same time, conservation organizations, project developers and governments are beginning to implement REDD pilot activities in developing countries.

Yet despite the increasing levels of interest and activity in REDD, there is a great deal of confusion that still surrounds the concept. The broad range of stakeholders interested and involved in REDD have very different levels of understanding and knowledge on REDD processes, practices and outcomes. This confusion is beginning to lead to unrealistic expectations, opportunistic land speculation by investors, and to naïve assumptions about what it takes to implement a REDD program.

How Was This Resource Manual Developed

The combined efforts of the Climate, Community, and Biodiversity Alliance (CCBA); Conservation International (CI); German Technical Cooperation (GTZ); Rainforest Alliance (RA); The Nature Conservancy (TNC); and World Wildlife Fund (WWF) led to the development of this resource manual to complement their REDD training program.

As leading organizations in both the development and implementation of REDD mechanisms, they see an urgent need to enhance the capacity of their staff and the capacity of their partners' staff in REDD activities. A training program was therefore developed to strengthen the capacity of a broad range of stakeholders to objectively assess the opportunities and risks of any REDD proposal; ultimately leading to the implementation of successful REDD programs.

The technical material for the training and this resource manual was developed in beginning of 2009 and is 'global' in nature. The global dialogue and debate will create ground rules for national and project led developments. A key question for the training program was how to ensure that the global debates and frameworks are translated into practical and realistic activities for exploration at the national and project levels.

In responding to this question, accurate and up-to-date information was required on the fundamental issues surrounding REDD. This manual collates this information to provide a valuable set of reference material for participants of the training program.

But please remember that REDD is a quickly evolving field and the material presented in this manual is only a starting point for discussion, not an end point.

To complement this resource manual, an on-line resource has also been developed. This on-line resource will feature a self-guided training course on REDD that will interactively guide visitors through various information modules. The online content will be available to the public and the website will also serve as a place to post follow-up information after REDD trainings and other important information resources.

Contents of this Resource Manual

This resource manual provides information from a broad range of sources to help explore the principal elements of REDD development.

The manual has been designed to complement the training program in both structure and intent. Therefore for each of the training sessions (topics), there is a corresponding section in this manual that allows for further exploration of the key issues discussed and debated during the training program.

The information covered in this resource manual includes:

Section 1 : The Background on REDD: The topics explore the contextual issues that have allowed REDD to become such an important forest conservation mechanism. Specific tropics include: Introduction to climate change

- The role of forests in climate change
- Drivers of deforestation
- Strategies to reduce deforestation

Section 2 : International Considerations: International negotiations currently underway are shaping and will continue to shape national and project level REDD activities. Understanding how these debates and frameworks will impact on national and project level REDD activities is important. Specific topics include:

- REDD Basics
- Technical elements of REDD
- REDD policy context
- Introduction to carbon markets
- Social considerations
- Considerations for biodiversity and other ecosystem services
- Legal aspects

Section 3 : National Considerations: Each country has a unique opportunity to design REDD systems that match their own context and circumstances. This presents both challenges and opportunities for those assisting with national processes. Specific topics include:

- The scale of REDD: National- and project-level activities
- National level REDD program guidelines
- National level REDD program case study

Section 4 : Project Considerations: Each REDD project will be unique, but implementation will still need to meet social, economic and environmental criteria if REDD is to live up to its expectations. Specific topics include:

- Project standards
- Project life-cycle
- REDD project case study

Annexes: Glossary, references and useful links are provided.

The reference manual will be updated and expanded as more and more material is included in the training program.

Feedback from participants on areas for improvement are greatly appreciated.
Please provide feedback and comments to **Rane Cortez at rcortez@tnc.org**

SECTION 1:
Background to REDD

1.1. Introduction to Climate Change
1.2. The Role of Forests in Climate Change
1.3. Drivers of Deforestation
1.4. Strategies to Reduce Deforestation and Forest Degradation

1.1. Introduction to Climate Change

Climate change science can seem technical and difficult to understand at first glance. This section of the resource manual is intended to provide you with basic information on climate change science in a clear and concise manner so that you can understand the causes and impacts of climate change.

Definitions:

What is Climate Change:

Any significant change in measures of climate (such a s temperature or precipitation) lasting for an extended period of time (typically decades)

United Nations Forum Convention on Climate Change (UNFCCC) defines Climate Change as:

A "a change of climate which is attributed directly or indirectly to human act ivity that alters the compo sition of the global atmosphere"

The Greenhouse Effect

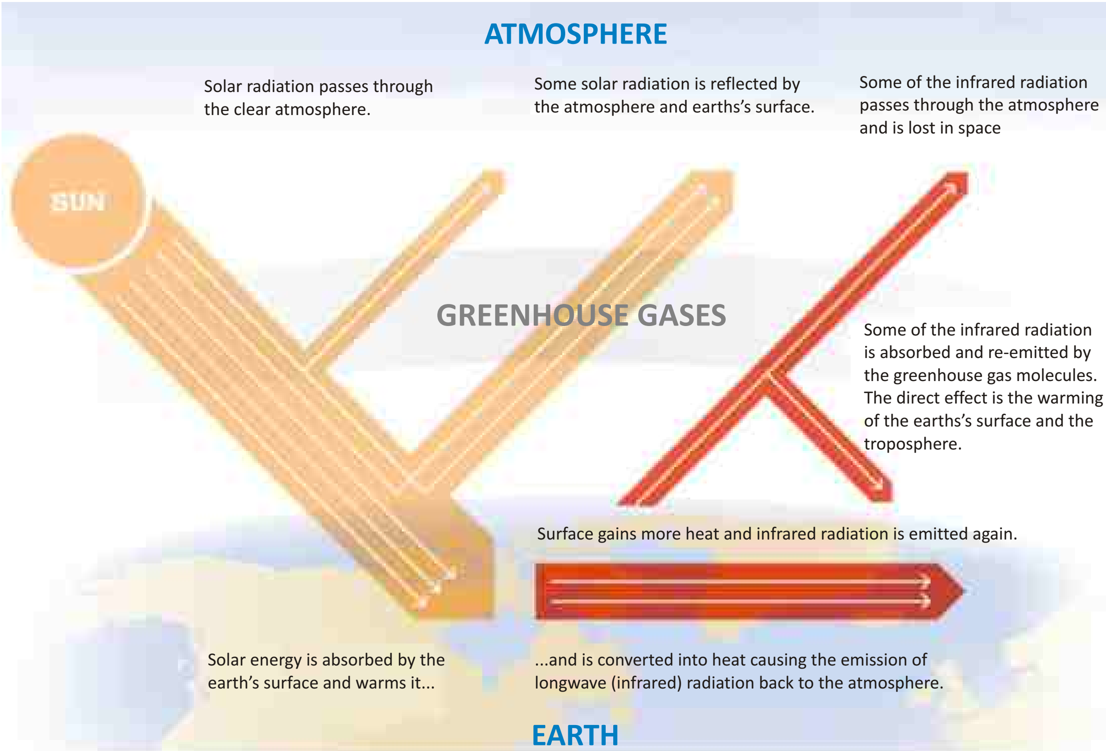
In order to understand why climate change is occurring, it is essential to understand the greenhouse effect. The Earth receives most of its energy from the sun in the form of short wave radiation. Much of this incoming solar radiation passes through the atmosphere to reach the Earth's surface. The Earth absorbs some of this energy and radiates some back into the atmosphere in the form of infrared radiation. Outgoing infrared radiation has a longer wavelength than incoming solar radiation and can therefore be absorbed by certain gases in the atmosphere. The main gases that absorb infrared radiation are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O) and haloflourocarbons (HFCs). These gases trap some of the infrared radiation and re-radiate it back to the Earth's surface as heat, causing a warming effect known as the "greenhouse effect" (see Figure 1). (Visit **http://earthguide.ucsd.edu/earthguide/diagrams/greenhouse/** to see an animated presentation of the greenhouse effect.) The greenhouse effect is necessary to life on Earth as we know it; without it, the Earth's surface would be about 35ºC cooler on average.

Over the past 200 years, however, the burning of fossil fuels and the destruction of forests have caused the concentrations of heat-trapping greenhouse gases to increase significantly in our atmosphere. With more of these gases in the atmosphere, more radiation is absorbed and re-radiated back to Earth as heat. Thus, as the concentrations of these gases continue to increase in the atmosphere, the Earth's temperature also continues to increase. In the 20th Century, global temperatures have increased by 0.7ºC (1.3ºF)[1]. If concentrations of greenhouse gases in the atmosphere continue to increase, the average temperature at the Earth's surface could increase from 1.8 to 4 ºC (3 to 7ºF) above 2000 levels by the end of this century[2]. As will be discussed below, even the lowest estimates for global warming will have significant impacts on people and ecosystems.

[1]) Intergovernmental Panel on Climate Change (IPCC) 4th Assessment Synthesis Report (2007), 1.1, p.30.

[2]) IPCC 4th Assessment Synthesis Report (2007), 3.2 p. 35

Figure 1 : The Greenhouse Effect



Source : Okanagan University College in Canada, Department of Geography; United States Environmental Protection Agency (EPA), Washington; Climate change 1995, The science of climate change,constribution of working group 1 to the second assessment report of the Intergovermental Panel on Climate Change, UNEP and WMO, Cambridge University Press, 1996. GRID Arendal.

Greenhouse Gases

Greenhouse gases (GHGs) are gases released into the atmosphere through human activity that trap heat and thereby contribute to the warming of the planet. All GHGs contribute to climate change, but not all GHGs have the same level of impact – the relative potential to contribute to global warming is based on both their atmospheric 'life' (how long the gas will stay in the atmosphere) and their ability to absorb infrared radiation (see Table 1). The global warming potential indicates the level of impact each gas has on the climate relative to the impact of carbon dioxide (CO_2)

Carbon dioxide is the greenhouse gas that is most often mentioned in the context of climate change. This attention is due to the fact that CO_2 is the most prevalent greenhouse gas released by human activity. In 2004, for example, almost 50 billion tons of greenhouse gases were released, of which about 77% was CO_2. Methane contributed about 14%, and nitrous oxide made up about 8%, while the rest was made up of small amounts of HFCs, PFCs, and sulfur hexafluoride[3].

Because CO_2 is so prevalent, it is one of the most important emissions to address when mitigating climate change. Other gases, however, make a significant contribution to global warming despite lower emission levels. Nitrous oxide, for example, remains in the atmosphere longer than CO_2 and it absorbs 296 times more infrared radiation than Co_2.

---

[3]) IPCC 4th Assessment Working Group III Report (2007) p 103

Conversions:

Tons of Carbon Dioxide Equivalents (tCO_2e): Is the standard unit of measurement used to compare the emissions of the various greenhouse gases based upon their global warming potential (GWP). Therefore:

- 1 ton of CH_4 has the equivalent effect of 23 tons of CO_2.
- 1 ton or N_2O has the equivalent effect of 296 tons of CO_2

Table 1 : Greenhouse Gases and Global Warming Potential

Greenhouse Gas	Formula/ Abbreviation	Atmospheric Lifetime (years)	Global Warming Potential (CO^2 equivalent)
Carbon dioxide	CO_2	Approximately 100 years	1
Methane	CH_4	12	23
Nitrous oxide	N_2O	114	296
Chlorofluorocarbons	CFC-11	45	4,600
	CFC-12	100	10,600
Hydrofluorocarbons (HFC)	HFC-23	260	12,000
	HFC-125	29	3,400
	HFC-134a	13.8	1,300
	HFC-143a	3.4	120
	HFC-152a	1.4	120
	HFC-236fa	220	9,400
	HFC-4310mee	15	1,500
Perfluorocarbons (PFC)	CF_4	50,000	5,700
	C_2F_6	10,000	11,900
	C_4F_{10}	2,600	8,600
	C_6F_{14}	3,200	9,000
Sulfur hexafluoride	SF_6	3,200	22,200

Source:
IPCC Working Group I Report (http://www.grida.no/climate/ipcc_tar/wg1/248.htm)
Carbon Dioxide Information Centre (http://cdiac.ornl.gov/pns/current_ghg.html)
USA EPA Inventory of Greenhouse Gas Emissions and Sinks Factsheet
(http://www.epa.gov/climatechange/emissions/downloads06/06FastFacts.pdf

Drivers of Current Climatic Change

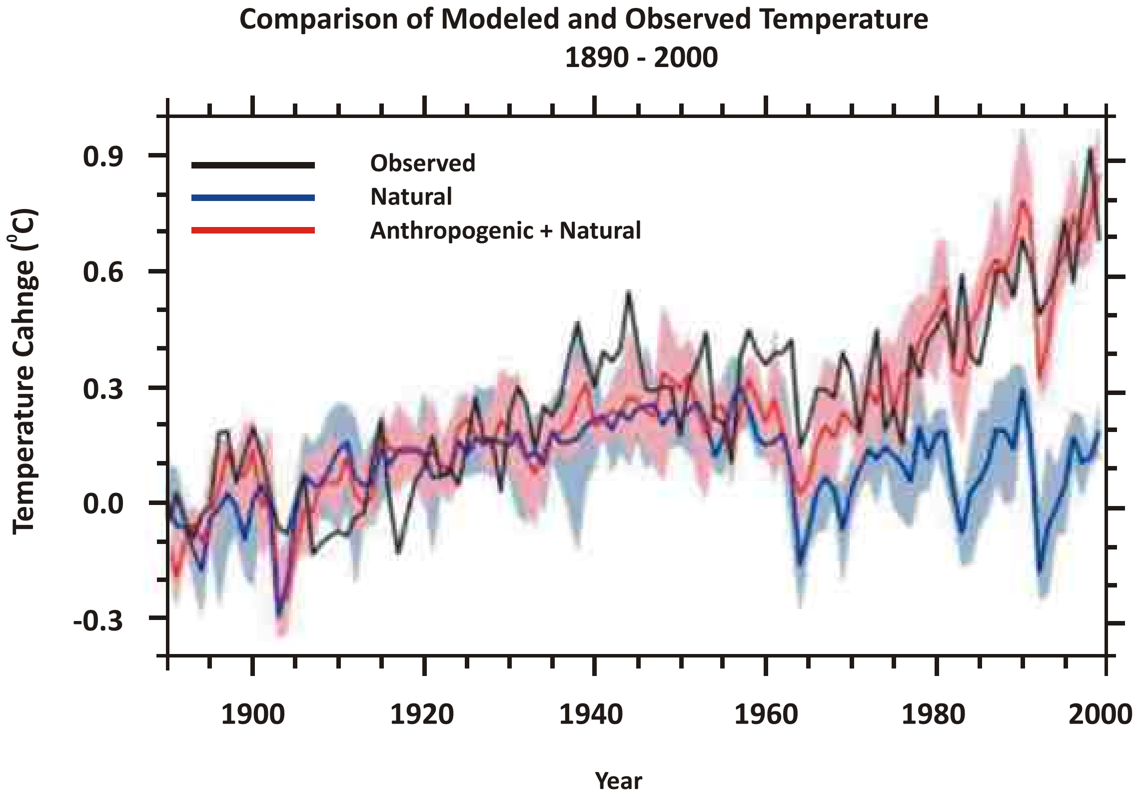
Unequivocal scientific evidence shows that the cause of the high rate at which climate change is occurring is the increased concentrations of greenhouse gases, particularly carbon dioxide, in the atmosphere[4]. Carbon dioxide concentrations are now at their highest level in the atmosphere in over 650,000 years, outweighing all other factors that contribute to climate change[5]. While natural processes can release these gases to the atmosphere, analyses reveal that the added gases bear the unique chemical signature of burned coal and oil and not the sign of gases released from volcanoes or geysers. Additionally, climate models show that the temperature increases observed today can only be explained when human activities are accounted for (see Figure 2). In the past, the planet has gone through cycles of warming and cooling, but the changes seen today are occurring much more rapidly than during a natural cycle. Orbital cycles, solar flares,

4) IPCC 4th Assessment Synthesis Report (2007), 2.1, p.36.

5) Ibid, 2.2, p.37

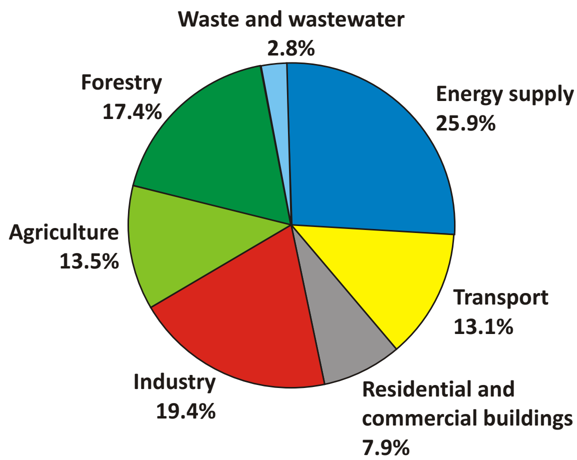
volcanic activity, and other natural factors appear to account for less than 10% of observed changes in global temperatures[6].

Figure 2 : Comparison of Modeled and Observed Temperature (1890 to 2000)



Source: Meehl, G.A., W.M. Washington, C.M. Ammann, J.M. Arblaster, T.M.L. Wigley, and C. Tebaldi, 2004 'Combinations of Natural and Anthropogenic Forcings in Twentieth-Century Climate', Journal of Climate, vol. 17, pp. 3721-7. **(http://www.bom.gov.au/bmrc/clfor/cfstaff/jma/meehl_additivity.pdf)**

Figure 3 : Sources of GHG Emission



Source : IPCC 4" Assessment Shyntesis Report Summary for Policymakers (2007), P.5.

---

[6]) IPCC 4th Assessment Working Group 1 Summary for Policymakers (2007), p.10.

It is clear that human activities are driving the current rate of climatic change. When people burn fossil fuels to heat their homes or fuel their cars, and when land is converted from forests to other uses, greenhouse gases are emitted to the atmosphere. Figure 3 illustrates the main sources of greenhouse gas emissions from human activities, while Table 2 provides information on which human activities result in emissions of which GHGs.

Table 2: Human activities that emit GHGs

Greenhouse Gas	Industrial Sources	Land Use Sources
Carbon dioxide (CO2)	Fossil fuel combustion and cement manufacturing	Deforestation and burning of forests
Methane (CH4)	Landfills, coal mining, natural gas production	Conversion of wetlands Rice paddies Livestock production
Nitrous oxide (N2O)	Fossil fuel combustion Nitric acid production	Fertilizer use Burning of biomass
Hydrofluorocarbons (HFCs)	Industrial processes Manufacturing	---
Perfluorocarbons (PFCs)	Industrial processes Manufacturing	---
Sulphur hexafluoride (SF6)	Electrical transmission and distribution systems	----

Climate Change Impacts

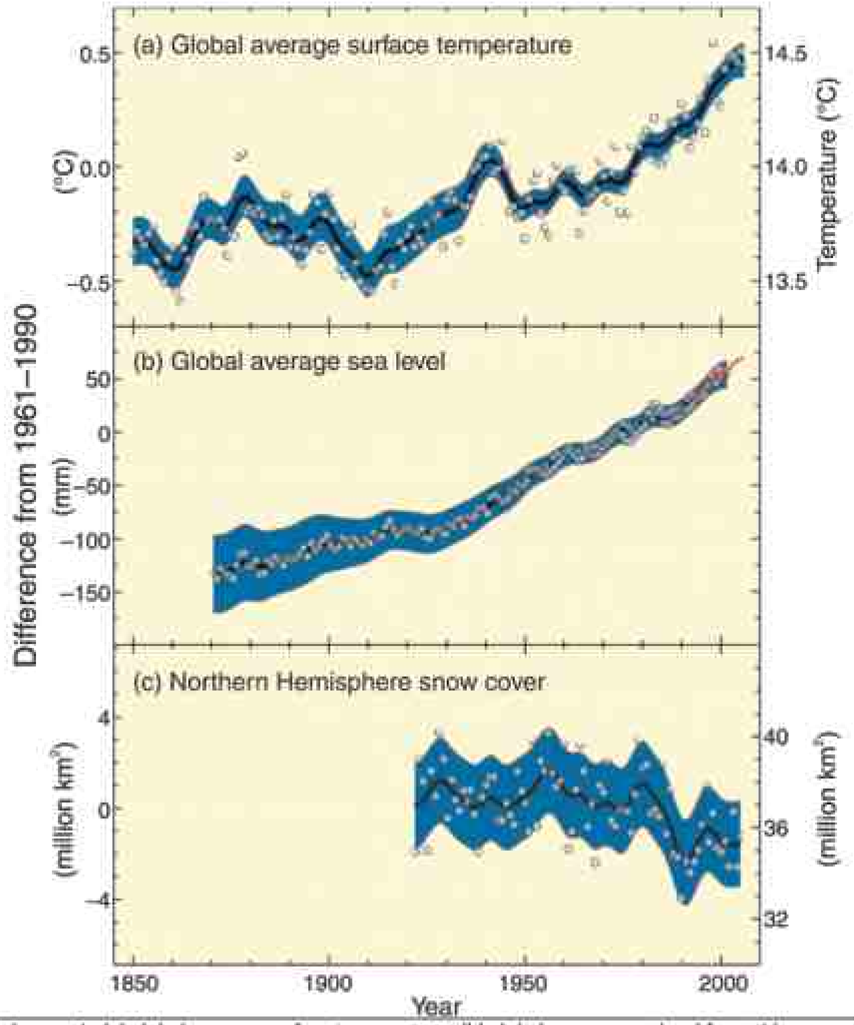
The impacts of climate change are already measurable and visible around the globe. Figure 4 illustrates some of the observed impacts. In addition, according to the IPCC[7], in the 20th Century:

- Global temperatures increased by 0.7ºC (1.3 ºF);
- Sea level rose 17 cm (7 inches);
- Northern Hemisphere snow cover declined 7%;
- Melting of glaciers and ice sheets around the world has accelerated;
- More droughts and other extreme weather events are occurring;
- Warmer ocean surface waters are fueling an increase in the intensity of Atlantic hurricanes;
- Warmer seas have caused coral bleaching and extensive death of coral reefs in the Caribbean and the South Pacific;
- Warmer temperatures and changing rainfall have shifted vegetation in tropical, temperate, and boreal ecosystems towards polar and equatorial regions and up mountain slopes;
- The alteration of seasons has changed the timing of life cycle events of plants and animals. Many plants are flowering earlier in the spring and some species of birds and other wildlife have changed migration and other seasonal behavior;
- Climate change has lifted the cloud deck in Central American montane forests, causing a fungus infection that has driven 75 amphibian species to extinction;

[7]) IPCC 4th Assessment Working Group IV (2007)

- Warmer temperatures have caused heat-related deaths of susceptible people around the world;
- Climate change has also altered the distribution of ticks and other vectors of human disease.

Figure 4 : Observed Changes in Surface Temperature, Sea Level and Snow Cover (1850-2000)



Observed changes in (a) global average surface temperature; (b) global average sea level from tide gauge (blue) and satellite (red) data and (c) Northern Hemisphere snow cover for March -April. All differences are relative to corresponding averages for the period 1961- 1990. Smoothed curves represent decadal averaged values while circles show yearly values. The shaded areas are the uncertainty intervals estimated from a comprehensive analysis of known uncertainties (a and b) and from the time series (c).

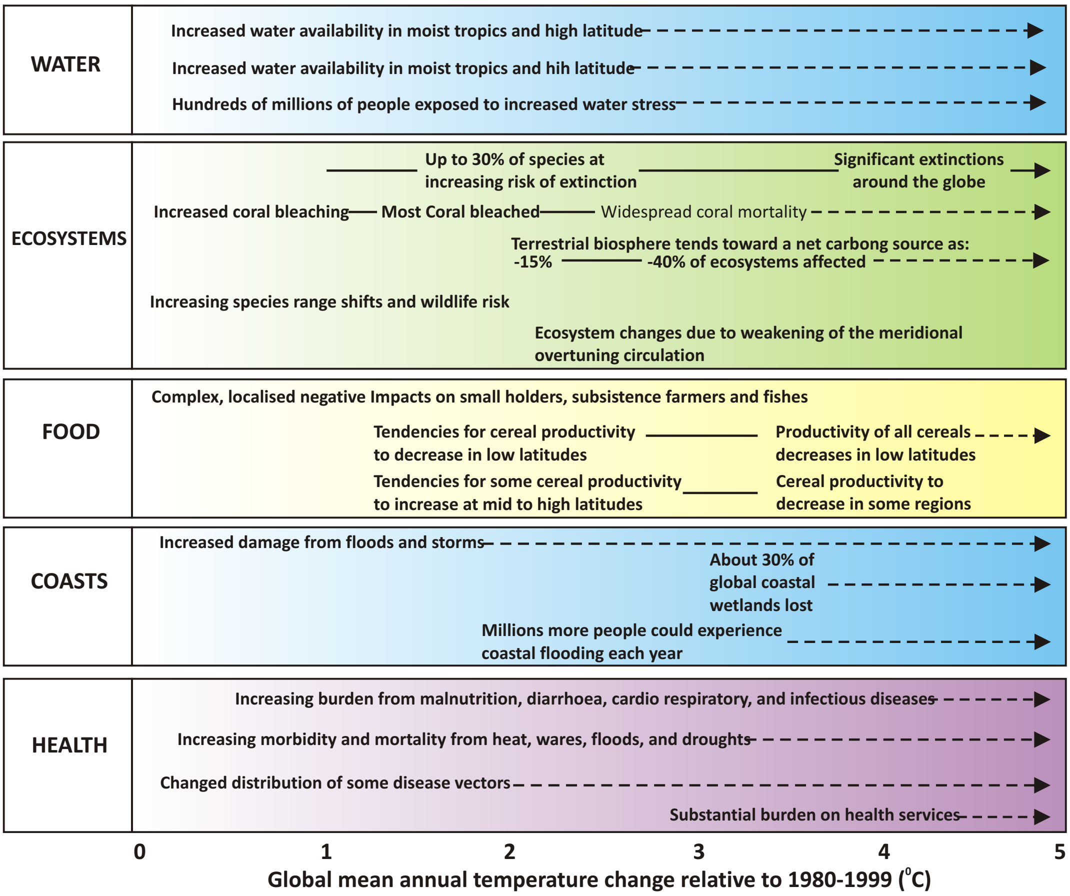
Source: IPCC 4th Assessment Working Group IV Synthesis Report (2007), p. 3.

These are just some of the impacts of climate change that the world is already experiencing today. Climate models project increasing impacts to people and ecosystems as temperatures continue to increase. Prevailing climate science has projected the impacts associated with various degrees of warming above the 1980-1999 average (see Figure 5 below). Increased coral bleaching, increased species range shifts, increased wildfire risk, and increased damage from floods and storms are all expected as a result of temperature increases of less than 2ºC. As temperature increases move closer to $2^{0}C$[8], the impacts are increasingly serious: up to 30% of species at increasing risk of extinction

[8]) IPCC 4th Assessment Working Group IV (2007), p 10.

and most corals are bleached[9]. Beyond 2ºC of warming, millions more people are projected to be affected by flooding each year, widespread mortality of coral reefs is projected, significant extinctions could occur around the globe, and 30% of global wetlands are projected to be lost.

Figure 5: Projected impacts of climate change



Source: IPCC Working Group IV Synthesis Report (2007)p. 10

Climate change solutions

In order to avoid the most serious impacts of climate change, humans will have to significantly reduce the amount of greenhouse gas emissions being put into the atmosphere. There are various ways to make these reductions, including increasing automobile efficiency, increasing access to and use of public transit, upgrading building insulation and energy systems, replacing fossil fuels with renewable energy, and reducing deforestation. Many governments, companies, and individuals are beginning to implement some of these strategies and therefore slowly reducing emissions.

In order to truly address this threat, these strategies will need to be seriously scaled up and energy and land use practices will need to undergo systemic changes. But how much reduction is needed? If we were only talking about the climate, it would make sense to try to reduce our emissions to zero as quickly as possible. Such an aggressive goal, however, would have serious political and economic implications and for those reasons the targets that policymakers tend to aim for are considerably less stringent. Because of the impacts laid out in the chart above, there has been a general convergence in many

9) IPCC 4th Assessment Working Group IV (2007), p 10.

policy circles around adopting a goal of limiting temperature increases to less than 2ºC above pre-industrial levels. As described above, impacts that result from higher levels of warming are increasingly serious and threatening.

To accomplish this goal, we will need to set a target for stabilizing atmospheric concentrations of CO_2. Scientific uncertainty remains about the exact figure to aim for, but the IPCC reports that in order to stay below a global average temperature increase of 2ºC we must stabilize global atmospheric concentrations of greenhouse gases at, or below, 450 parts per million (ppm) carbon dioxide equivalent (CO_2e). Even stabilizing at 450ppm does not guarantee that warming will be kept under 2ºC (see Figure 6). The IPCC has estimated that to achieve stabilization at this level, developed countries will need to reduce their emissions by 25-40% below 1990 levels by 2020 and 80-95% below 1990 levels by 2050, and developing countries will also need to make substantial reductions from current trends.

Figure 6: Stabilisation scenarios

CO_2 emission and equilibrium temperature increases for a range of stabilisation levels

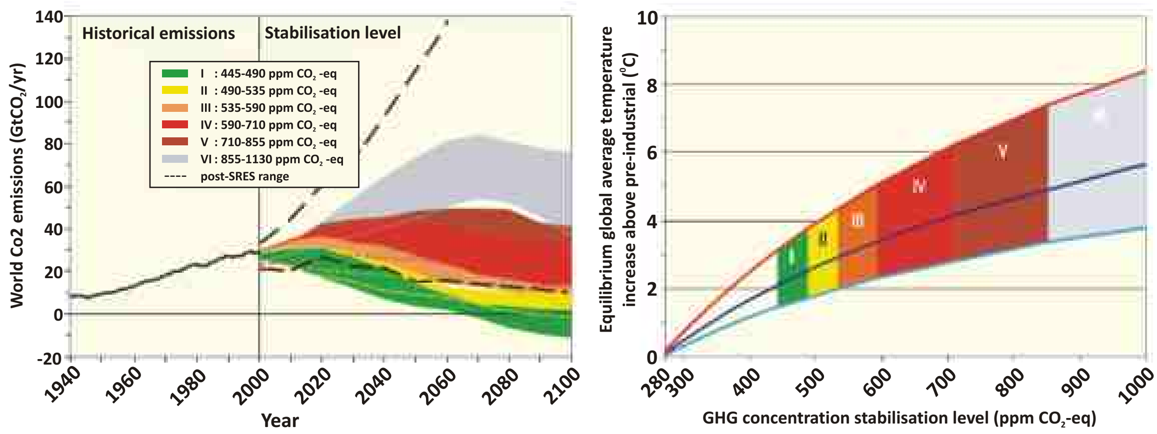


Figure 5.1. Global Co_2 emission for 1940 to 2000 and emission ranges for categories of stabilisation scenarios from 2000 to 2100(left-hand Panel) and the corresponding relationship between the *stabilisation target and the likely* equlibrium global average temperature increase above pre-industrialright-hand panel. Approaching equilibrium can take several centuries, especially for scenarios with higher levels of stabilisation. Coloured shading show stabilisation scenarios grouped according to different targets (stabilisation category I to IV). The right-hand panel shows ranges of global average temperature change above pre-industrial, using (I)'best estimate' climate sensitivity of 3°C (blackline in the middle of shaded area), (ii) upper bound of likely range of climate sensitivity of 4.5°C (red line at top of shaded area) (iii) lower bound of likely range of climate sensitivity of 2°C (blue line at the bottom of shaded area). Black dashed lines in the left panel give the emission range of recent baseline scenarios published since the SRES (2000). Emission ranges of the stabilisation scenarios comprise Co_2-only and multigas scenarios and correspond to the 1oth to 90th percentile of the full scenario distribution. Note: Co_2 emission in most models do not include emission from decay of above ground biomass that remains after logging and deforestation, and from peat fires and drained soils. (WGIII Figures SPM.7 and SPM.8)

Source: IPCC Ar4 Synthesis Report p66

In addition to IPCC estimates, other research indicates that even deeper reductions may be needed. A recent scientific paper by Hansen et al[10] indicates that stabilizing atmospheric concentrations of CO_2 at 350ppm provides the best chance of limiting warming to 2 ºC. Atmospheric concentrations of CO_2 are currently at 385ppm, which means that, to meet that target, humanity would need to reduce our emissions to the extent that atmospheric concentrations begin to decrease. Though there are uncertainties around the most appropriate target to aim for, it is clear that significant reductions of greenhouse gas emissions will be needed over the coming decades in order to avoid the most serious impacts of climate change. The IPCC 4th Assessment Report found that both economic and technological capabilities currently exist to meet the lowest emissions trajectories and therefore avoid the worst impacts of climate change.

---

10) Hansen et al. 2008. Target Atmospheric CO_2: Where should humanity aim?

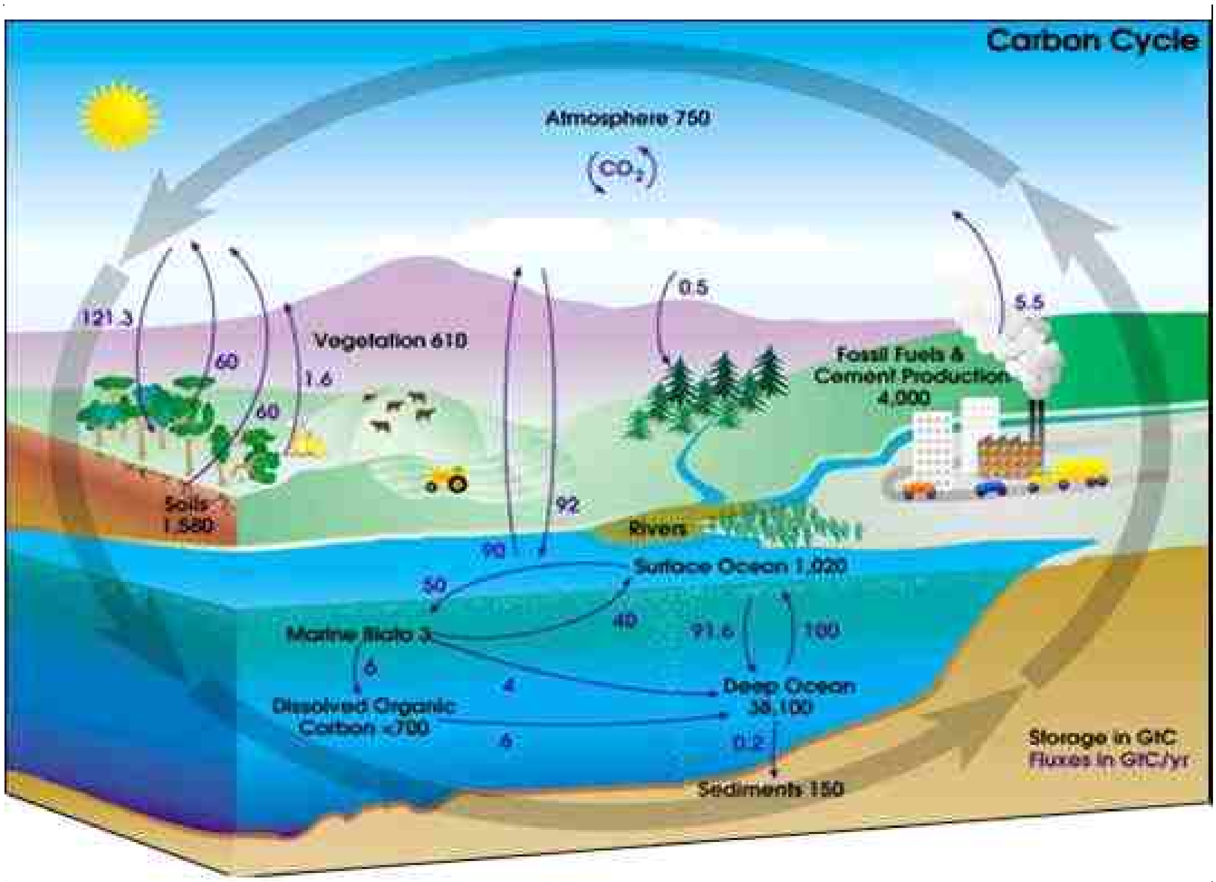
1.2. The Role of Forests in Climate Change

Forests play a dual role in climate change. Forests can be a source of greenhouse gases, emitting carbon dioxide to the atmosphere when they are burned or destroyed and forests can also act as a “sink,” removing carbon dioxide from the atmosphere and storing it as carbon in their biomass as they grow.

Forests in the Global Carbon Cycle

Approximately half of all organic matter, such as trees and grasses, is carbon. Just as burning fossil fuels produces greenhouse gases, burning organic matter, like trees and grasses, also produces greenhouse gases. Cultivating the soils after deforestation further contributes to climate change, as cultivation oxidizes 25-30% of the organic matter in the upper meter of soil and releases carbon dioxide to the atmosphere. Forests also emit greenhouse gases to the atmosphere when they are logged - only a fraction of the trees that are harvested end up as wood products, so the majority of the forest vegetation ends up as waste and as that waste decays, carbon is released into the atmosphere. Planting trees and restoring forests reverses the flux of carbon in the cycle, withdrawing carbon from the atmosphere and accumulating it again in the soils and vegetation through photosynthesis.

Figure 7: The Global Carbon Cycle



Forests therefore play an important role in the global carbon cycle (see Figure 7). In 2005, global forests covered 4 billion hectares, or 30% of the total land area worldwide[11]. According to the United Nations Food and Agriculture Organization's (FAO) Global Forest Resources Assessment 2005 (FRA 2005), the world's forests stored 283 gigatons (Gt) of carbon in their biomass alone, while the total carbon stored in forest biomass, deadwood, litter and soil together adds up to one trillion tons - roughly 50 percent more than the amount found in the atmosphere.

Within a forest, carbon is stored within 6 commonly considered 'pools' as described in Table 3.

Table 3 : Forest Ecosystem Carbon Pools

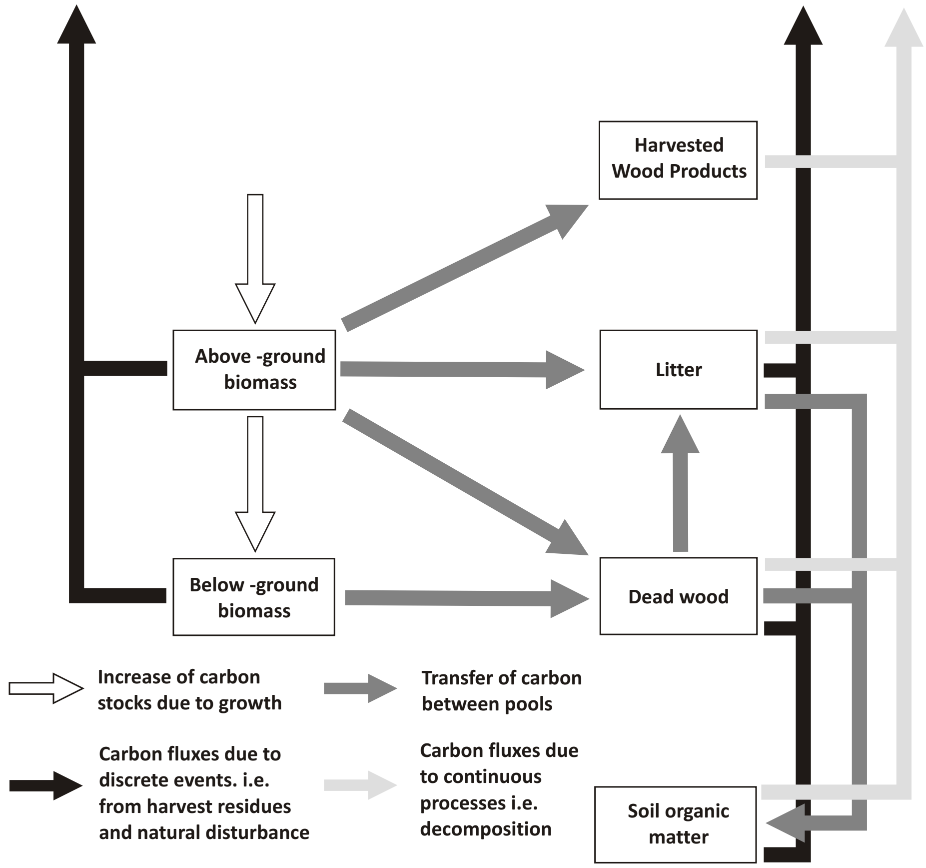
Carbon Pool	Description	Percentage Carbon Storage in Total Ecosyst em
Aboveground live tree biomass	All tree components from stem to tops, leaves, and bark. Typically measured for trees greater than 5 to 10 cm diameter at breast height (dbh)[12]; calculated using allometric equations based on dbh for tree species densities.	15% to 30%
Belowground live tree root biomass	Coarse and fine roots, often calculated using a formula	4% to 8%
Coarse woody debris	Standing (greater than 5 to 10 cm diameter at breast height) and downed (greater than 10 to 15 cm small end diameter, 1.5 to 3 m length), often measured	1%
Non-tree aboveground live biomass	Herbaceous vegetation, regeneration and small diameter trees, and multi-stemmed shrubs.	.06%
Organic litter and duff	Often only measured if affected by management	.04%
Inorganic mineral soil	Rarely measured because of wide variability	60 to 80%

Carbon is continually cycling through these pools and into the atmosphere, as shown in Figure 8. As you can see in diagram, carbon is removed from the atmosphere and stored in biomass as a result of photosynthesis and growth. That carbon is, in turn, transferred to litter, soil, and harvested wood products as trees die or the forest is logged. Carbon is emitted to the atmosphere through continuous processes such as decomposition and through discrete events such as harvesting or other disturbances.

[11]) United Nations Food and Agriculture Organization (FAO) Global Forest Resources Assessment 2005

[12]) DBH or diameter at breast height is a standard height to measure the diameter of trees. It is generally 1.3 meters above ground.

Figure 8 : Generalized Carbon Cycle for Terrestrial Ecosystems



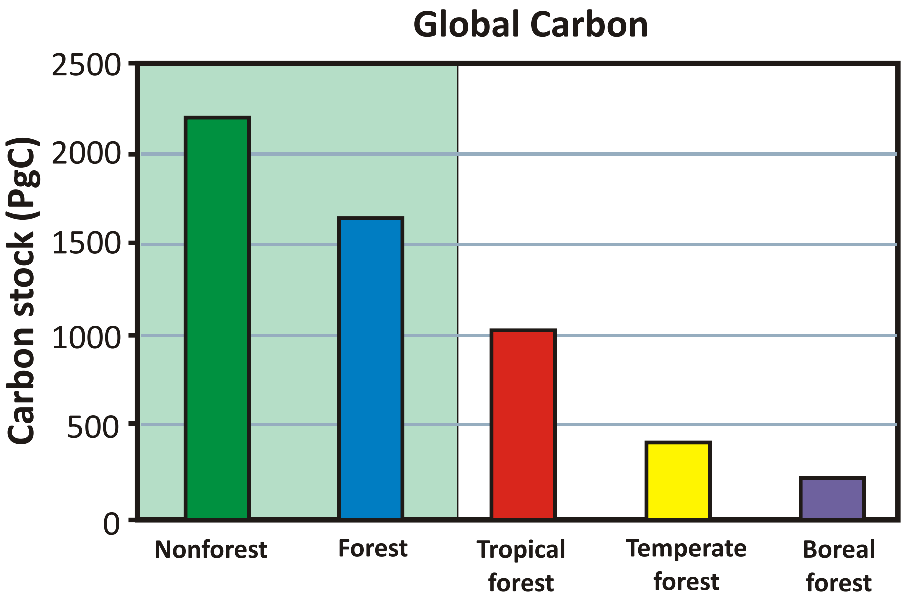
Source: 2006 IPCC Guidelines for National Greenhouse Gas Inventories Vol. 4 AFOLU p2.8

Forest Types and Carbon

The amount of carbon that a forest can store depends on the type and characteristics of the forest. Tropical forests account for approximately 40% of the world's forest area, yet they hold more carbon than temperate zones and boreal forests combined (see Figure 9). Trees in tropical forests hold, on average, about 50% more carbon per hectare than trees outside the tropics[13]. Thus, equivalent rates of deforestation will generally cause more carbon to be released from deforestation in the tropical forests than from deforestation in forests outside of the tropics. Compounding the problem is the fact that deforestation rates are highest in the tropics – 13 million hectares are destroyed each year. Tropical forests are thus a particularly important factor in climate change because of their high capacity for absorbing and storing carbon, and due to the high rate at which they are disappearing.

13) Houghton, R.A. Tropical Deforestation as a Source of Greenhouse Gas Emissions. In: Tropical Deforestation and Climate Change 2005. Amazon Institute for Environmental Research

Figure 9 : Global Carbon Stocks for Three Different Forest Types



Source:
G. B. Bonan. 2008. Forests and Climate Change: Forcings, Feedbacks, and the Climate Benefit of Forests. Science 320, 1444 -1449

Carbon Emissions from Tropical Deforestation

Forests and other terrestrial sinks annually absorb approximately 2.6GtC, while deforestation and land-use activities emit approximately 1.6GtC, significantly reducing the role forests play as a net carbon sink[14]. For comparison, annual fossil fuel and cement emissions are approximately 6.4GtC annually[15]. The 1.6GtC emitted by deforestation and land use activities account for approximately 20% of total emissions. That is more than the entire global transportation sector. If current trends continue, tropical deforestation will release about 50% as much carbon into the atmosphere as has been emitted from the worldwide combustion of fossil fuels since the start of the industrial revolution. Deforestation therefore represents a significant amount of greenhouse gas emissions that must be addressed if climate change is to be effectively mitigated.

Forest Degradation

Deforestation is not the only means through which forests emit carbon. Deforestation is defined by the Intergovernmental Panel on Climate Change (IPCC) as the "permanent removal of forest cover and withdrawal of land from forest use, whether deliberately or circumstantially." The United Nations Framework Convention on Climate Change (UNFCCC) and IPCC employ a minimum crown cover criterion of 10% to differentiate between forests and non-forests. If crown cover is reduced below this threshold, deforestation has occurred. Forest degradation, on the other hand, occurs when crown cover is reduced, but not below the 10% crown cover threshold. While deforestation refers to the entire loss of patches of forest via clearing, degradation refers to the gradual thinning of forests.

Forest degradation can lead to substantial carbon emissions. In some countries, forest degradation is a larger source of greenhouse gas emissions than deforestation, and such degradation is often an important precursor to deforestation. Globally, degradation accounts

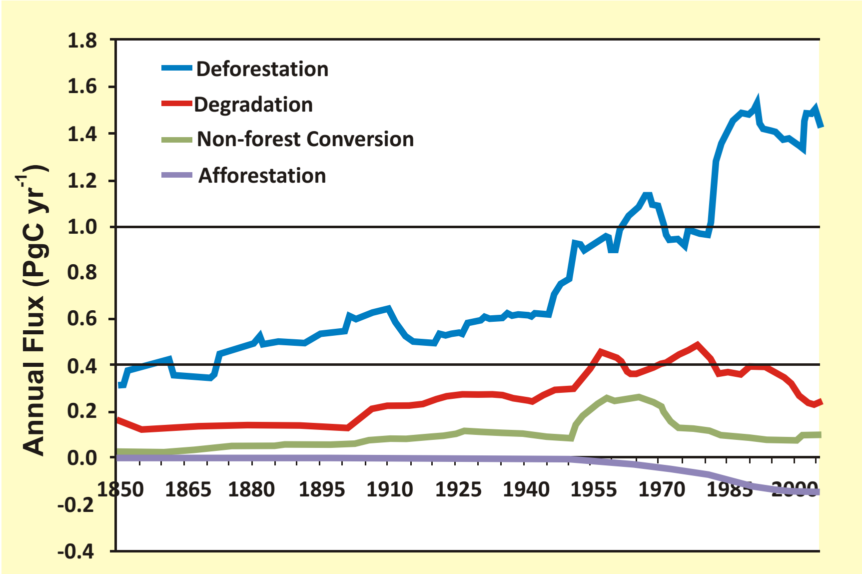
---

[14]) IPCC 4th Assessment Working Group I Report, 2007.

[15]) Ibid

for approximately 5-25% of forest emissions[16]. Figure 10 breaks down the emissions from forests into various types of conversion.

Figure 10 : Deforestation and degradation emissions



Source: Presentation by R.A. Houghton at the WWF Symposium 2007

Definitions:

Deforestation: Most definitions characterize deforestation as the long-term or permanent conversion of land from forested to non-forested. UNFCCC Conference of the Parties defines deforestation as "the direct human-induced conversion of forested land to non-forested land."

- IPCC defines deforestation as the "permanent removal of forest cover and withdrawal of land from forest use, whether deliberately or circumstantially."
- The FAO defines deforestation as "the conversion of forest to another land use or the long-term reduction of the tree canopy cover below the minimum 10 percent threshold".

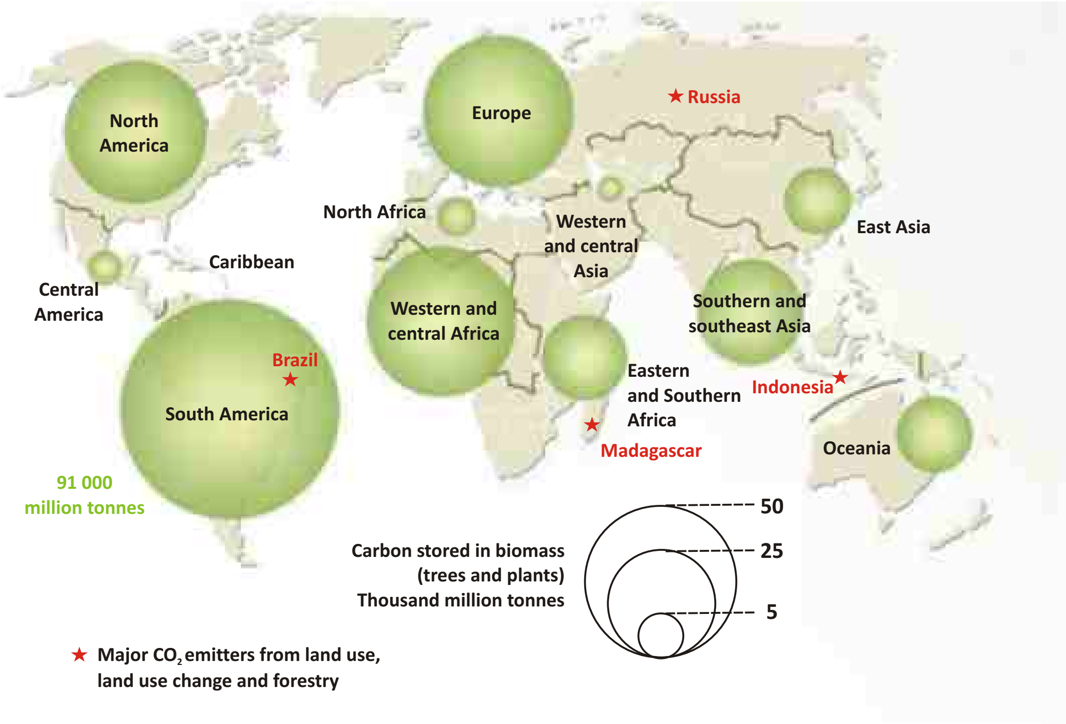
Degradation: The FAO refers to forest degradation as "changes within the forest which negatively affect the structure or function of the stand or site, and thereby lower the capacity to supply products and/or services".

Most organizations and agencies employ a minimum crown cover criterion of 10% to differentiate between forests and non-forests. If crown cover is reduced below this threshold, deforestation has occurred. Forest degradation, on the other hand, occurs when crown cover is reduced, but not below 10%. While deforestation refers to the entire loss of patches of forest via clearing, degradation refers to the gradual thinning of forests.

Deforestation and forest degradation are not evenly distributed around the world. For example, Indonesia and Brazil account for 50% of the world's emissions from deforestation. As a result of emissions from deforestation and forest degradation, Indonesia and Brazil are ranked as the third and fourth highest GHG emitters in the world.

[16]) Houghton, R.A. Tropical Deforestation as a Source of Greenhouse Gas Emissions. In: Tropical Deforestation and Climate Change 2005. Amazon Institute for Environmental Research

Figure 11 : Regional emissions of carbon from tropical deforestation



Source: Emmanuelle Bournay, UNEP/GRID-Arendal; http://maps.grida.no/go/graphic/carbon-inventory

Table 15 : countries with the highest emissions from LULUCF

Country	Deforestation 2000 2005 (1000ha/yr) (FAO)	CO_2 emissions from LULUCF in 2000 (Mt/yr) (CAIT)
Indonesia	-1,871	2,563.10
Brazil	-3,103	1,372.10
Malaysia	-140	699.00
Myanmar	-466	425.40
Congo, Dem. Rep.	-319	317.30
Zambia	-445	235.50
Nigeria	-410	194.80
Peru	-94	187.20
Papua New Guinea	-139	146.00
Venezuela	-288	144.10
Nepal	-53	123.50
Colombia	-47	106.10
Mexico	-260	96.90
Philippines	-157	94.80
Cote D'Ivoire	-15	91.20
World Total		**7,618.6**

Source : UN Food and Agricultural Organization; WRI's Climate Analysis Indicators Tool Database

Forests' Role in Climate Change Mitigation

While deforestation and forest degradation contribute substantial amounts of greenhouse gases to the atmosphere each year, measures to protect, restore, and sustainably manage forests offer significant climate change mitigation potential. Conserving existing forests will keep emissions from deforestation out of the atmosphere. Restoring forests through planting trees or facilitating the natural regeneration of trees will increase the amount of carbon that forests can remove from the atmosphere and store in their biomass. Finally, sustainably managing forests through measures such as reduced impact logging and more strategic planning of road construction can help avoid emissions from forest degradation. All of these measures can make a substantial contribution to the mitigation of climate change.

Each strategy offers the potential to substantially reduce CO_2 emissions as is shown in Table 5. Forestry activities are therefore very important tools for mitigating climate change.

Table 5 : Forest Mitigation Strategies

Strategy	Forest Type	t CO_2/ha avoided
Avoided Deforestation	**Africa** – Lowland moist forest	569 - 734
	Africa - seasonal forest	220 - 257
	Africa - dry forest	92 - 184
	America - lowland moist forest	330 - 569
	America - secondary or logged	231 - 734
	Asia - lowland moist forest	95 - 200
	Asia - dry forest	81 - 147
Abating Degradation		**t CO_2/ha reduction**
	Preventing Logging – Bolivia lowland moist forest	73-110
	Reduced Impact Logging – Sabah moist hill forest	158
Afforestation and Reforestation		**T CO_2/ha/yr captured**
	Boreal – 60 year rotation	2 - 7
	Temperate – 15 to 60 year rotation	7 - 26
	Tropics – Eucalyptus, 5 – 16 year old	15 – 51
	Tropics – Teak, 25 – 75 years old	7 - 15
	Tropics – Pine, 5 – 30 years old	11 - 44

Source : Winrock International, 1999

1.3. Drivers of Deforestation

Understanding the drivers of deforestation and the pressures forests face is essential to designing effective institutions and policies to slow forest conversion. Investing in forest conservation projects without understanding the causes of deforestation can result in wasted resources with no impact on deforestation rates. [17]

While the specific drivers of deforestation are diverse, one thing is true for all forests: people clear and log forests because they gain from doing so [18]. Gains can be unsettlingly small or impressively large, short-term or sustainable, but one economic framework applies to all forest actors: landholders and land claimants will deforest [19] when it offers higher returns than maintaining the land in forest. Road access, good soils, and higher prices for agricultural goods all motivate deforestation. These relationships are strongly affected by governance and tenure conditions. Where governance is weak and tenure poorly defined, powerful interests can seize forest resources, and smallholders can engage in conflict-ridden races for property rights. But even landholders with secure tenure may choose deforestation if it offers higher returns.[20]

How big are the private gains from deforestation?

The gains from deforestation vary tremendously with place, technology, and land use systems. Profits from deforestation may range from near zero to thousands of dollars a hectare.

- In Cameroon, oil palm and intensive cocoa cultivation has a net present value of more than $1,400 a hectare. In Brazil's Cerrado (Savanna) region, converting native woodlands to soy crops results in land worth over $3,000 a hectare.
- In contrast, mean land values are just $400 a hectare in another hotspot, the Atlantic forest of Bahia Brazil, one of the world's most important places for biodiversity conservation. Only small fragments of forest remain in this long-settled region.

Source : Chomitz, K. 2007. At Loggerheads? Agricultural Expansion, Poverty Reduction, and Environment in the Tropical Forests. The World Bank.

Identifying what drives deforestation in particular areas is more complex. A comprehensive review of 152 case studies of deforestation concluded that tropical deforestation is most often driven by the interactions of many different causes. Only a few drivers of deforestation are globally universal, and these drivers and other factors interact differently among regions and even among cases. here are two main categories of drivers of deforestation: proximate (direct) causes and underlying causes.

- Proximate causes are human activities that directly impact the environment at the local level.
- Underlying drivers are social, economic, political and/or cultural processes that indirectly impact deforestation.

[17]) Chomitz, K. 2007. At Loggerheads? Agricultural Expansion, Poverty Reduction, and Environment in the Tropical Forests. The World Bank.

[18]) Ibid.

[19]) Ibid.

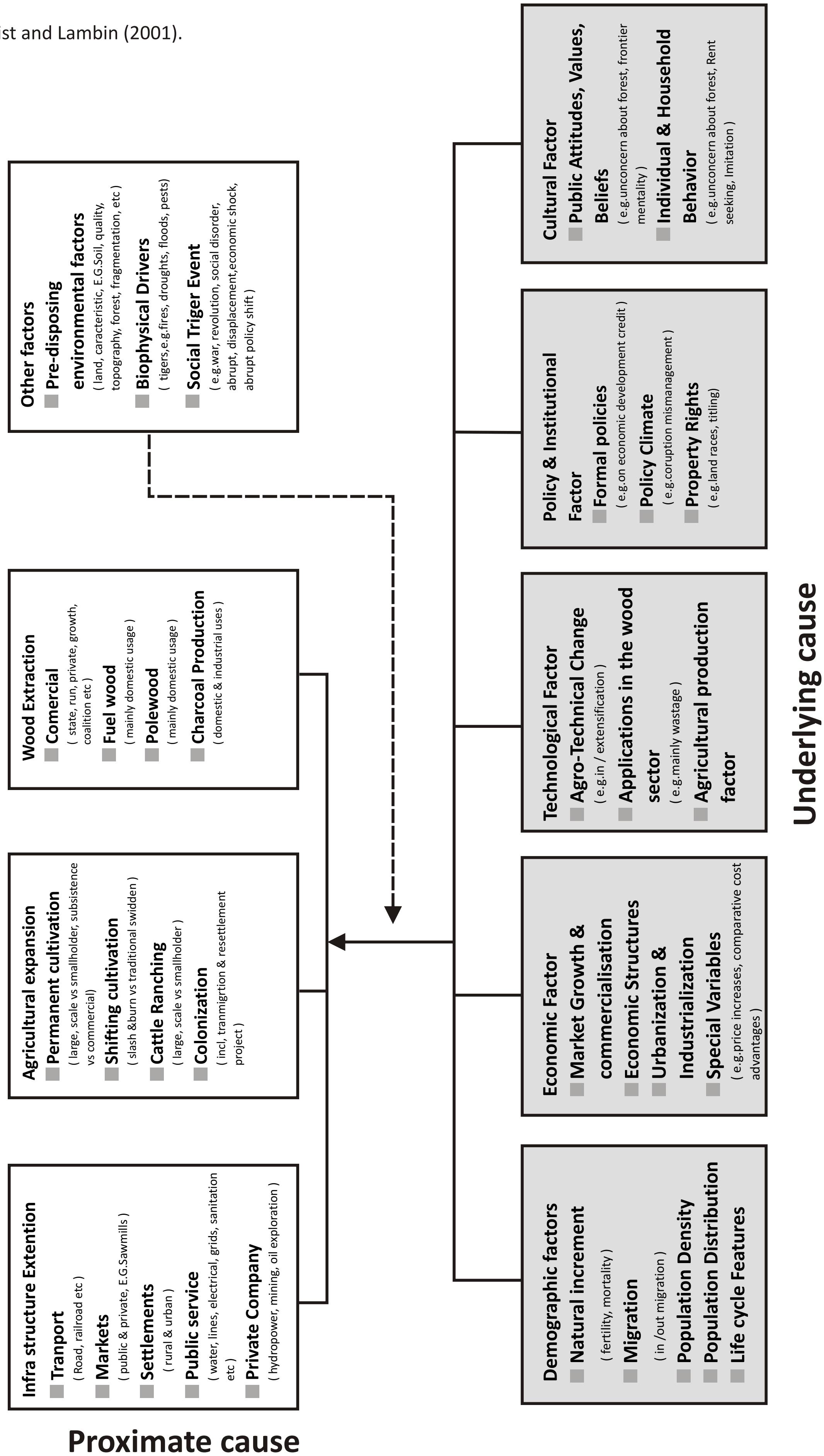
[20]) Ibid

[21]) Geist, H. and E. Lambin. 2001. What Drives Tropical Deforestation? LUCC Report Series No. 4

Geist and Lambin (2001) suggest that the most prominent underlying causes of deforestation and degradation are economic factors, institutions, national policies, and remote influences that drive the proximate causes of agricultural expansion, wood extraction, and infrastructure extension (see Figure 12). At the global scale, agricultural expansion was, by far, the leading land-use change associated with nearly all deforestation cases studies, whether through forest conversion for permanent cropping, cattle ranching, shifting cultivation, or colonization agriculture.

Figure 12 : Causes of deforestation

Source: Geist and Lambin (2001).



Proximate or Direct Causes

Proximate causes are the direct, immediate causes of the removal of forest cover and are often influenced by the combination of a number of underlying forces. Geist and Lambin found that the extension of overland transport infrastructure, followed by commercial wood extraction, permanent cultivation, and cattle ranching are the leading proximate causes of deforestation.

Agriculture

Agricultural expansion is a leading cause of tropical deforestation around the world and includes the establishment of permanent crops, cattle ranching, shifting cultivation, and colonization and resettlement on forest frontiers. There are many motivating factors that stimulate the decision to convert forestland to agriculture, including:

- Favorable environmental conditions;
- High prices for agricultural outputs;
- Low wages for laborers who clear the land; and
- Demographic changes.[22]

Contrary to widely held views shifting cultivation is not the primary cause of deforestation because regrowth and secondary forest succession often follows this type of agricultural use.

Logging

Timber extraction is generally not a direct cause of deforestation (although it is a significant cause of forest degradation), but logging operations and the supporting road systems do open up previously inaccessible forests to pressures from human settlement and fire.

Infrastructure Expansion

Forests can be cleared to construct roads, settlements, public services, pipelines, mines, dams, and other infrastructure. None of these tend to be a large factor in terms of the area of forestland cleared. But indirectly, road construction provides access to forests and is linked to deforestation. Without roads, timber operations, commercial agricultural businesses, and individual settlers would not be able to access and exploit forest resources beyond the forest frontier.

Underlying Driving Forces

Underlying drivers of deforestation are the broader economic, political, technological, cultural, and demographic factors - the fundamental social processes that underpin the proximate factors of deforestation. It is difficult to clearly attribute deforestation in a specific area to its underlying cause and it is therefore very difficult to develop strategies to address these drivers. While tropical deforestation is best explained through multiple factors and drivers acting together, economic factors are however the prominent underlying force.

---

[22]) Kanninen, M. et al. 2007. Do Trees Grow on Money? The implications of deforestation research for policies to promote REDD. CIFOR

Economic Factors

Global and national economic factors play a prominent role in deforestation. Commercialization and the growth of timber markets and increasing demand for products that can be cultivated on converted forestland are frequent underlying forces of deforestation. Other economic variables such as low domestic costs for land, labor, fuel, or timber and product price increases further contribute. Macroeconomic factors such as external debt, foreign exchange rate policy, and trade policies governing sectors linked to deforestation and degradation also have significant potential to impact land use changes.[23]

Policy and Institutional Factors

The policy and institutional factors that play a significant role in deforestation include formal pro-deforestation measures, land tenure arrangements, and policy failures. In some cases, policies encourage deforestation through agricultural incentives, transportation and infrastructure development, urban expansion, and timber subsidies. Weak governance institutions and corruption are also associated with illegal logging in parts of Asia and with agricultural expansion in Latin America. This situation is not helped by ambiguous laws, regulations, and jurisdictions that allow for forest protection policies to be avoided or ignored.

Poorly defined property rights and land tenure issues can result in open-access forests that can be overexploited. Where property rights are unclear, redundant, or weak, incentives for investing in long-term returns from natural resources are low. But establishing property rights may sometimes further encourage deforestation, depending on how property rights are assigned and how resources were used by historic stakeholders.

Technological Factors

Technologies that increase the profitability of agriculture can promote the expansion of agriculture into forested land that might be considered marginal agriculture land. Hypothetically, technologies that encourage the intensification of agriculture can decrease deforestation pressure by increasing productivity and employment on a given plot. However, there is little evidence indicating that this trend is taking place, and if improved technologies are increasing the profitability of agriculture, this can cause in-migration to forest frontier lands further encouraging deforestation.

Cultural Factors

Cultural factors, including lack of public concern for forest conservation and the unwillingness to change historic forest practices such as burning contribute to deforestation. But certain cultural values or norms, such as the establishment of sacred forest areas, can also increase protection from land conversion and degradation.

Demographic Factors

Contrary to common perspectives, natural population growth alone has a minimal impact on deforestation. Only in-migration of colonizing settlers into sparsely populated forest areas will have a notable influence on deforestation.

[23]) Ibid.

Box 1 : Deforestation Economics

Deforestation is driven by many inter-related and complex factors, but ultimately land use change is about returns to those clearing the forests. This box delves deeper into eight major themes that describe the economics of deforestation.

1) Richer Farmers Are Better Able to Finance Deforestation:

A poor household can't afford to clear as much forest as one that is better off. In Bolivia clearance and land preparation costs range from $350-605 a hectare; in Costa Rica clearance costs $78 a hectare. Sometimes these costs can be partly or fully covered by timber sales or wealthy interests who are willing to finance clearing by smallholders on their behalf. Where these income streams are lacking, farmers must be able to mobilize a lot of family or community labor or outlay cash for the hire or workers, chainsaws and possibly bulldozers.

Cash and credit constraints hamper poor smallholders from deforestation. Relaxing these constraints through income transfers, stronger credit markets and better opportunities for off-season employment could increase both incomes and deforestation.

2) Good Land Is Cleared First

Soils, topography, and climate (the '*agroclimate*') strongly influence land rents. Differences in soils and climate can explain most country-level variations in land values in countries as diverse as Brazil, India, and the United States. Deforestation will occur at a fast rate on land that offers higher rents. Therefore there is a strong correlation between soil quality and deforestation.

Highly valuable trees of sufficient quality and quantity, with good access will also generate high land rents which can also finance deforestation for agricultural development.

3) Higher Prices for Farm Output Induce Forest Conversion and Benefit Farmers

Other things being equal, higher prices for crops and lower prices for farm inputs will spur faster deforestation. This is important because many policies can affect farmgate prices, including taxes, tariffs, subsidies, road improvements, and exchange rates. Most studies have found a strong link between higher agricultural prices and more rapid or extensive deforestation as shown in Figure 16.

4) Higher Timber Prices Put Pressure on Old-growth Forests but Create Incentives for New Ones

Do high timber values promote or undermine sustainable forest management? The answer depends on the state of the forest and how it is regulated. New roads or new markets can confer enormous value on old-growth forests. Individual trees can be worth thousands of dollars. In the absence of regulation, rising prices can encourage loggers to sweep deeper into old-growth forests, mining sellable trees.

But where societies are willing and able to require forest owners to practice sustainable forest management, higher timber prices make such regulation less onerous. And where forests have already been depleted, higher timber prices make it more attractive to reforest or establish plantations.

5) Higher Off-farm Wages Discourage Deforestation in Marginal Areas

Many forest dwellers have opportunities to earn off-farm wages. The opportunities may be on neighboring farms or plantations, in nearby market towns, or in distant cities. As these opportunities become more lucrative, there is less incentive to use forest for subsistence or low-value crops. But if off-farm wages drop, incentives to deforest will increase as people will need to depend more and more on the forest for subsistence.

6) Agricultural Technology Promotes Growth - with Ambiguous Implications for Deforestation

Technological improvements in agriculture are crucial to raising rural welfare (through higher farm incomes) and consumer welfare (through lower food prices). But the gains from these improvements may be unequally shared. And except in special circumstances, technological improvements are likely to increase pressures on forest. This is important where technology advances reduce farm costs leading to higher farmgate returns (see point 3).

7) Tenure Is Good for Landholders, but Has Uncertain Effects for Deforestation

Landholders with secure tenure are more likely to make physical improvements, invest in perennial crops, and plant and maintain forests. But secure tenure does not guarantee that landowners will not clear forest lands. They will likely extract and sell large, mature, slow-growing trees which are easily accessible. Landholders will then weigh the relative advantages of forest clearing or farm cropping. Granting land tenure to Indigenous Peoples, however, often leads to effective forest protection.

8) Roads Provide the Path to Rural Development and Forest Clearance

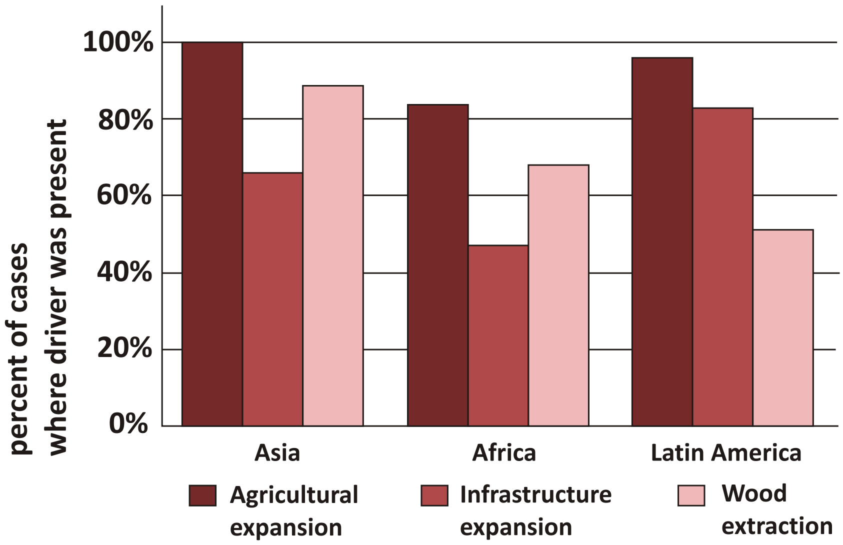
Providing road access is the most important policy factor in determining deforestation areas and rates. Rural roads are generally believed to raise rural incomes and alleviate poverty, for the same reasons they promote deforestation: by raising farmgate prices, lowering prices of urban manufactured goods, and promoting more intensive demand for labor. Rural roads also facilitate access to nonfarm employment in towns, which are often crucial to alleviating poverty in rural areas.

(Chomitz 2007)

Regional Differences

Although the causes of deforestation vary around the world, some regional trends result from similar social, economic, and environmental conditions within a region (see Figure 13). In Africa, degradation and deforestation is associated with the over-harvesting of fuel wood by individuals for domestic uses. Population pressure and unclear land rights are also dominant factors in Africa where uncertain land tenure drives a shift from communally owned land to privately held land and results in deforestation caused by shifting agriculture. In Latin America cattle ranching is the dominant cause of deforestation followed by road construction. In mainland and insular Asia, commercial timber extraction followed by clearing for agriculture is the dominant driver of deforestation.

Figure 13 : Extent of leading causes of deforestation



Source: EarthTrends, 2008; using data from Geist & Lambin 2002

In addition to regional variation, drivers of deforestation vary according to their location at a more local level. Kenneth Chomitz, of the World Bank, divided forests into three types, according to their proximity to the agricultural frontier:

- ***Forest-agriculture mosaiclands***—where land ownership is usually better defined, population densities higher, markets nearer, and natural forest management often cannot compete (from the landholder's perspective) with agriculture or plantation forestry.
- ***Frontier and disputed areas***—where pressures for deforestation and degradation are increasing, and control is often insecure and in conflict.
- ***Areas beyond the agricultural frontier***—where there is a lot of forest, few but largely indigenous inhabitants, and some pressure on timber resources.

Understanding both regional and local drivers of deforestation is important when developing a strategy for reducing deforestation, because challenges play out differently in different types of forests. According to Chomitz, the following objectives are the keys to addressing deforestation in each forest type:

- *In mosaiclands : to* ensure that land managers take into account the benefits of forest maintenance f or their neighbors.

- *At the frontier and in disputed regions:* to resolve conflicting claims to forestlands and determine where gains from forest conversion outweigh environmental damages.
- *Beyond the agricultural frontier:* to recognize and defend long-standing indigenous claims, tap and fairly share rents from timber exploitation while avoiding needless forest degradation, and avert disorderly races for property rights when the frontier arrives.

Analyzing the Drivers of Deforestation for REDD

In order to identify the drivers of deforestation in an area slated for REDD activities and analyze how those drivers might be effectively addressed, both the proximate causes and underlying forces must be considered as well as the interactions between them. To begin to think about these things, project developers can look at a past time period and identify where deforestation occurred in the area of interest during that time period. They can then make maps of in-country factors that may lead to future deforestation including: roads, sawmills, population centers, land-use zoning, and topography and analyze how those factors influenced past deforestation and therefore how they might influence future land-use in the area of interest. Land use and land cover maps of such activities as cattle ranching, soy farms, and oil palm plantations can further guide the analysis. The participation of indigenous peoples or other forest dependent communities in the area-as well as other local stakeholders such as local government and private sector operations in the analyses is essential to provide the local context and knowledge about the factors driving deforestation in a particular area.

1.4. Strategies to Reduce Deforestation and Forest Degradation

When thinking about REDD, it is important to remember that the same strategies that forest managers have employed for decades to reduce deforestation can be used in a REDD framework. REDD is not an entirely new system of forest conservation, it is simply a new way of financing that conservation. Therefore, it is important to take some time to think about the strategies that have been in use for years to protect standing forests and reflect on what has worked and what has not, before delving more deeply into the concept of REDD. This section will review some forest conservation strategies that are in use around the world, and provide a few case studies of how those strategies have worked or not worked. The strategies discussed in this section by no means represent a comprehensive list of all the available strategies to reduce deforestation and forest degradation, they merely represent some examples.

In this section, the strategies are divided into four categories:

- Forest Protection
- Sustainable Production
- Conservation Finance
- Responsible Trade

We will investigate each in turn.

Forest Protection

Strict protection of forests through the establishment of protected areas is often the first strategy that comes to people's minds when they think about forest conservation. Protected areas will have a significant role to play in preserving global forests as long as their design and management include the full participation of affected communities. Forest protection leaves forests almost entirely intact by closing them off to production and extractive use. In theory, strict forest protection is the most effective way to conserve forest carbon and the biodiversity and other ecosystem services forests provide. In practice, however, it has often been difficult to prevent illegal activities from harming the forest. Here we will look at two strategies for forest protection:

- Protected areas
- Infrastructure management

Protected Areas

A protected area, as defined by the International Union for Conservation of Nature (IUCN), is :

> *"An area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means."*

There are various types of protected areas with differing levels of protection. Some protected areas allow very little access to and use of their natural resources, while others allow the sustainable use of the ecosystem. The IUCN specifies six categories of protected areas:

- *Strict nature reserve/wilderness area:* protected area managed mainly for science or wilderness protection
- *National park :* protected area managed mainly for ecosystem protection and recreation
- *Natural Monument :* protected area managed mainly for conservation of specific natural features

- *Habitat/Species Management Area :* protected area managed mainly for conservation through management intervention
- *Protected Landscape/Seascape:* protected area managed mainly for landscape/seascape protection and recreation.
- *Managed Resource Protected Area :* protected area managed mainly for the sustainable use of natural ecosystems.

Protected areas can be very effective at conserving natural ecosystems, but their success often depends on the support of local communities. It is therefore very important the design and management of protected areas includes the full participation of affected communities.

Infrastructure Management

As discussed in the previous chapter, infrastructure expansion, particularly road building, frequently leads to deforestation. In order to minimize the impact that infrastructure expansion has on forest carbon, communities, and biodiversity, it is important that rigorous environmental and social assessments are applied to all major infrastructure projects. This will help governments expose the inevitable trade-offs between different policy objectives, make decisions in the full knowledge of the likely impact on deforestation and rural livelihoods, and put in place mitigation strategies where necessary.

Sustainable Production

Countries will not be able to put 100% of their remaining forests under strict protection. Demand for forest products will require that some of those forests are used for production. Sustainable production of those products can have significant carbon benefits, as well as community and biodiversity benefits. To meet this vision of sustainable production, a shift of policies and practices in several sectors will be required, including in agriculture, timber, and alternative employment. Numerous methods of promoting sustainable production are already in use, including: land swaps, agroforestry, sustainable forest management, and alternative income generation.

Land Swaps

Agricultural extensification onto non-forested land not currently being used for agriculture also offers potential for forest conservation. The Brazilian Cerrado region, for example has an estimated 106 million hectares of currently unused land outside of forested land which would be suitable for agriculture. Estimates also indicate that there are at least 16 million hectares of lands which were converted to agriculture and cattle ranching in the Brazilian Amazon that have now been abandoned. Incentivizing companies or individuals to convert already degraded land into agriculture rather than converting intact forests could provide significant benefits for forest carbon, communities, and biodiversity.

Agroforestry

Agroforestry systems, in which trees are interspersed across pasture and cultivated land, can be one way to achieve the combined benefits of improving income streams from agriculture, protecting biodiversity and maintaining or increasing forest cover.

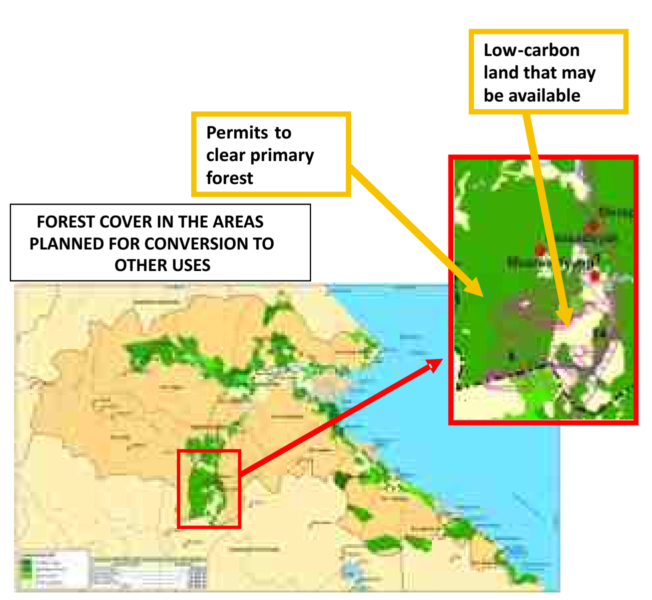
Box 2 : Case Study : Land Swaps on Oil Palm Plantations in Indonesia

Logging, mining and the rapidly growing oil palm industry are killing off the forests of Indonesia faster than anywhere else on earth. The destruction of these forests produces 80 percent of Indonesia's carbon emissions, placing it among the world's top emitters of climate changing greenhouse gasses, alongside the United States and China.

On Indonesia's island of Borneo, the district of Berau—which spans 5.4 million acres, 75 percent of which is covered by forest— is working to become the first municipality under the national program to implement the new conservation strategies and measurably reduce the amount of carbon it emits into the atmosphere.

Berau's forests face serious threats from logging — both legal and illegal — as well as from mining operations and the spread of palm oil plantations, which have rapidly overtaken much of Indonesia's lands as demand for biofuels and consumer products such as cosmetics and cooking oil increases around the world.

While large corporations have profited from these operations, local communities as well as Indonesia's government do not reap the same benefits. Illegal logging costs Indonesia up to $4 billion a year in lost revenue. Local communities often have no land rights and therefore are never paid for logging that occurs in their forests. And as forests disappear, so do the vital water and food resources they provide to local communities. The forests of Berau are also home to one of the world's largest populations of orangutans.



One of the strategies Berau will use to stop the growing threat that deforestation poses to its economy and communities is to use “land swaps” to move the development of palm oil plantations to already degraded areas and away from healthy and undisturbed forests. Under this strategy, oil palm concessionaires will receive incentives to retire their permits to clear primary forests and instead create their plantations on already degraded land. Initial scoping for this project indicates that some companies are motivated to separate themselves from the overall oil palm sector and eager to cooperate in the program if it helps improve their image. This program will require significant legal work with government and communities to resolve land tenure issues in degraded areas, scientific work to optimize strategies for reclaiming degraded land, and capacity building with local communities to ensure that they are prepared to benefit from the economic opportunity that oil palm represents.

Sustainable Forest Management

The Food and Agriculture Organization (FAO) defines Sustainable Forest Management (SFM) as the stewardship and use of forests and forest lands in a way, and at a rate, that maintains their biodiversity, productivity, regeneration capacity, vitality and their potential to fulfill, now and in the future, relevant ecological, economic and social functions, at local, national, and global levels, and that does not cause damage to other ecosystems.

In simpler terms, the concept can be described as the attainment of balance - balance between society's increasing demands for forest products and benefits, and the preservation of forest health and diversity. This balance is critical to the survival of forests, and to the prosperity of forest-dependent communities. Sustainable Forest Management can also have significant carbon benefits.

Community forest management is one type of SFM in which local communities undertake activities which are geared toward the sustainable use of forest resources. There is evidence that community forest management, where successfully applied, has reduce deforestation, generated more sustainable income streams for communities and contributed to the acquisition of technical skills.

Box 3 : Case Study : Community Forest Management

With the help of Conservation International (CI), the Wai Wai people of Konashen District in Guyana have taken the bold step of creating the nation's first Community Owned Conservation Area (COCA).

Under regulations passed by the Guyana parliament, the Wai Wai community formally designated their land a protected area and adopted a management plan, developed with technical and financial support from CI, for the 625,000-hectare (1.54-million-acre) tract on the northern border of Brazil's Pará state.

As managers of the new COCA, the 204 Wai Wai of Konashen District are building a “conservation economy” based on the sustainable use of their natural resources. The plan will create jobs from conservation activities, such as newly trained para-biologists working with researchers to assess the territory's flora and fauna, and local rangers patrolling the area. Other economic activities include ecotourism and expanding the traditional Wai Wai handicrafts business.

The Wai Wai received formal title to their land in 2004, and immediately asked for CI's assistance in managing their lands for conservation and development. Over the next three years, the Wai Wai leadership worked with CI, Guyana's Environmental Protection Agency and the Ministry of Amerindian Affairs to develop the necessary management plan, regulations and structure to become a COCA that will bring economic benefit to the Wai Wai while protecting part of the largest remaining swath of pristine rainforest on Earth.

By making their homeland a COCA, the Wai Wai will join and benefit from Guyana's National Protected Areas System and an endowment trust being established by the government of Guyana. CI's Global Conservation Fund and the German government are major contributors to the endowment fund.

Alternative Employment

The promotion of off-farm employment, as part of a broader economic strategy, can help reduce deforestation. As demand for agriculture and timber products continues to grow, the need for labor to produce them will continue. In some areas, however, deforestation from subsistence farming may occur through a lack of alternative livelihoods for those living in and near forests. In such areas the promotion of industries generating off-farm employment opportunities may help to reduce deforestation.

Conservation Finance

REDD, as currently proposed, is essentially a conservation finance mechanism. There are many other innovative conservation finance mechanisms currently in use around the world, including debt-for-nature swaps and payment for ecosystem services schemes. These and other sources of conservation funding offer important lessons for a future REDD mechanism.

Debt-for-Nature Swaps

Debt-for-nature swaps are agreements between the donor government and the government of a developing country in which:

- Donor government forgives a portion of the country's debt, and
- The money that would have gone to pay the debt is then used to conserve tropical forests.

Debt-for-Nature swaps were made possible when the U.S. Congress passed the **Tropical Forest Conservation Act** in 1998, which established legislation that created current debt-for-nature swaps. Debt-for-nature swaps create a link between a country's external debt and financing for biodiversity conservation. These are voluntary transactions through which an amount of hard-currency debt owed by a developing country government (debtor) is exchanged by the creditor for financial commitments to conservation by the debtor, usually in local currency. The proceeds generated by a debt-for-nature swaps are often administered by local conservation or environmental trust funds, which disburse grants to specific projects and ensure accountable, transparent and decentralized management. In Indonesia the German Government and the Indonesian Government are implementing a debt-for-nature-swap in the amount of 5,3 million Euro. Activities financed through the debt-for-nature-swap are supporting selected National parks in Sumatra.

Payments for Ecosystem Services

"Payments for ecosystem services", also called payments for environmental services (or PES for short) is the name for a variety of arrangements through which the beneficiary of ecosystem services pay back the providers of those services.

The ecosystem services in question could be maintenance of water quantity and quality; provision of biodiversity resources for food, fuel, or medicines; carbon sequestration; landscape beauty and wildlife husbandry in support of tourism and eco-tourism; and more. Ecosystem services may be present at any scale, from local to national to international (international ecosystem services are often called "global commons") and all these scales may allow a PES approach.

Payment schemes may be a market arrangement between willing buyers and willing sellers, such as tourist companies paying African communities for their protection of local wildlife. It can also be a scheme intermediated by a large private or public entity, for example, a portion of household water bills in New York is used by the water company to buy watershed protection services from farmers in the vicinity of the water company intake. Or the scheme can be government-driven, where public revenues are used to pay the providers of ecosystem services like in Costa Rica where the Government uses a fraction of the tax on energy to buy forest conservation services from farmers. Whatever the payment scheme the golden rule for a functioning PES scheme should be that those who pay are aware that they are paying to secure the provision of a valuable ecosystem service, and that those who are paid engage in measurable activities to provide the ecosystem services in question.

Box 4 : Case Study : Debt-for-Nature Swaps in Costa Rica

In 2007, The Nature Conservancy brokered the largest debt-for-nature swap under the Tropical Forest Conservation Act — a deal that will secure long-term, science-based conservation for Costa Rica's tropical forests:

- The United States will forgive $26 million in debt owed to it by Costa Rica.
- This move will in turn provide necessary funds that will be used to finance forest conservation in Costa Rica over the next 16 years, protecting one of the world's richest natural treasures for future generations.

The debt swap is unique in that it utilizes scientific analysis to determine the sites towards which the funds will be directed.

Biodiversity Under Threat

Costa Rica is a small nation — but it's home to some of the largest tracts of concentrated biodiversity on Earth. Its lush tropical forests are home to several endangered species such as jaguars, quetzals, scarlet macaws, howler monkeys, tree frogs and a host of other wildlife.

However, Costa Rica's natural treasures are under increasing pressure from human activity. Logging, development, agricultural expansion, gold mining, overfishing and unregulated tourism are just some of the factors threatening the country's ecosystems — and making the deal critical for nature and the people who depend on it.

"The funding that is a result of this debt swap will also allow local communities, 80 percent of which live in The Amistad Region, to pursue sustainable and economically viable livelihoods, thus improving their lives and sustaining the biodiverse resources on which they depend," said Zdenka Piskulich, program director for the Conservancy in Costa Rica.

Six Areas Will Benefit

The $26 million will be used to conserve Costa Rica's magnificent forests in six areas — sites chosen from a blueprint of conservation gaps that the Conservancy helped create for Costa Rica.

- The Osa Peninsula is where rain forest meets sea in the Southwest corner of Costa Rica. The Osa is home to the jaguar, squirrel monkey, Baird's tapir, Scarlet Macaw, more than 370 bird species and a large variety of plant life.
- The Amistad region contains the largest untouched tract of rainforest in Costa

Rica. The Amistad region borders Costa Rica and Panama and is home to a wealth of wildlife—including the ocelot, Baird's tapir, giant anteater and more than 350 species of birds.

- Maquenque — home to the Great Green Macaw and ocelots — is rich in natural habitats including wetlands, lagoons, and forests.
- Tortuguero lies near the Caribbean Sea and consists of rich expanses of forests. It provides a safe refuge for jaguars, Green Macaws and several species of turtle.
- Zona Norte del Rincon de la Vieja is the area north of the Rincón de la Vieja volcano. The area has rich dry forests and is home to deer, peccaries, sloths, pumas, toucanets and 257 species. s of bird
- Nicoya Peninsula in northwestern Costa Rica is home to beautiful beaches and rich rainforests. It is home to jaguars, ocelots, coatis, sloths and a wide variety of plants and birds.

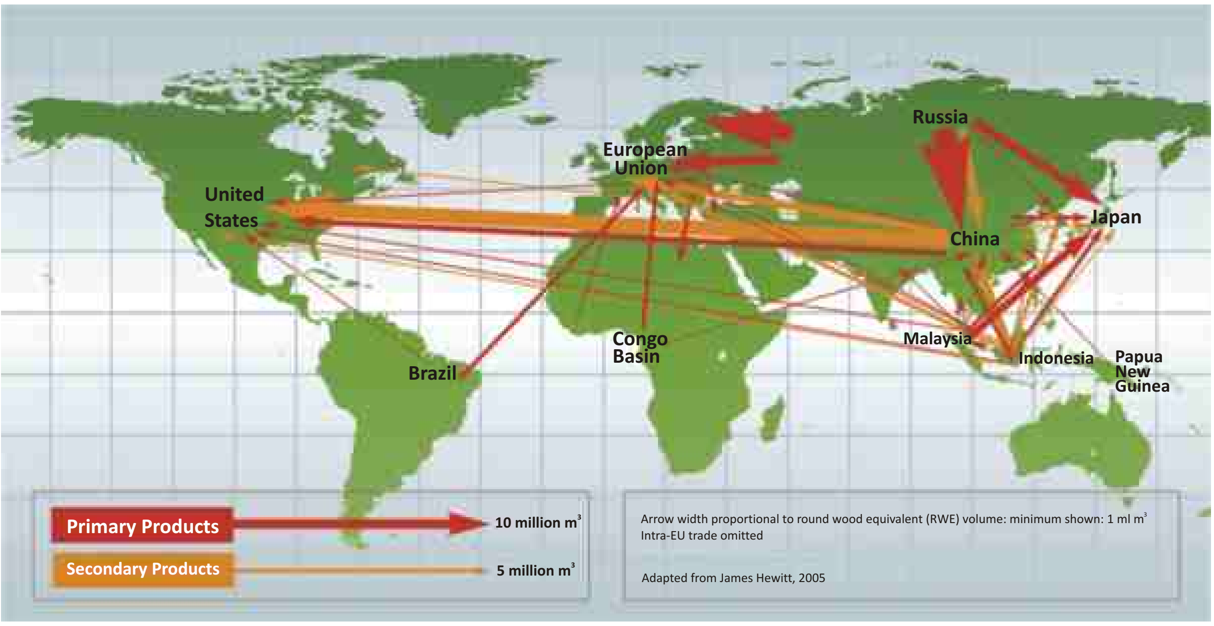

Responsible Trade

The forest products industry, estimated at $150 billion per year, is global and complex. A tree may be cut in Indonesia, manufactured into a table in China, sold to a retailer in New York, and bought by a business in Florida. Figure 15 illustrates some of the complexity of the market.

A significant part of this industry harms the world's forests. Each year, more than 32 million acres of natural forest around the world are logged, often illegally and unsustainably. Much of this wood then enters international markets. As a result, many consumers in the United States – currently the largest wood products market in the world – unwittingly contribute to environmentally and socially destructive forest practices.

Actions in both producer and consumer countries can help change this. Government policies in timber-producing countries that reduce illegal logging and demand-side actions in consumer countries that create a demand for sustainably-produced products can support a shift to sustainable forest management in tropical countries. This section will investigate demand-side management and forest certification programs as methods to combat illegal logging and promote sustainable forest management.

Figure 14 : Forest Products Trade



Source: The Nature Conservancy

Demand-Side Management

Demand-side policies in consumer countries (developed countries and emerging economies like China and India) can play a significant role in incentivizing a shift to sustainable production. Demand-side measures can help drive policy change, promote international cooperation on research and technology transfer, promote co-benefits, stimulate markets, and establish internationally agreed standards on what constitutes sustainability.

As an example of such policies, the United States recently amended the Lacey Act to require all importers to declare the species and country of origin of an plant or plant product, including wood. Penalties range from $250 to in excess of $500,000 with a possibility of jail sentence for knowingly sourcing, or failing to exercise due care when sourcing, products that contain illegal timber or plants.

Forest Certification

Forest certification is a market-based, non-regulatory conservation tool designed to recognize and promote responsible forest management. Through certification, timber harvest planning and practices are evaluated by an independent third party according to standards that address environmental protection as well as social and economic welfare. In most cases, wood is tracked through the "chain of custody," the path taken by raw materials from the forest to the consumer, including all successive stages of processing, transformation, manufacturing and distribution. In the marketplace, certified wood and forest products may be labeled so that businesses and consumers can choose products derived from responsibly managed forests.

Forest certification creates a unique connection between local forest management practices and global purchasing decisions. It holds the potential to transform international forest trade and to help conserve forest ecosystems around the world. Since its development in the early 1990s, forest certification has come to be recognized as the leading market-based conservation initiative, doing more for forest conservation than any other tool in the past 15 years. Around the world, several hundred million acres of forest have been certified. Nearly 60 forest certification systems operate around the world, most of them designed for country-level application.

Box 5 : Case Study : Teak Farms in Indonesia

In South Sulawesi, Indonesia, what began with 152 hectares of smallholder teak wood lots that are individually and privately owned by 196 farmers across 12 villagers has grown to today's FSC certificate covering 556 hectares with 550 members.

The road to certification involved a rigorous process. In South Konawe District, people from forty-six villages started by creating a cooperative called Koperasi Hutan Jaya Lestari (KHJL). Nearly two hundred farmers joined the cooperative. In 2004 they began working with Tropical Forest Trust, a nonprofit organization based in Switzerland, to close the gap between existing management practices and those that the FSC deems as responsible forestry. KHJL applied for the certification assessment at the end of 2004. After on-site evaluations of forest areas in a sample of twelve of the active villages involved in the cooperative, the Rainforest Alliance auditing team compiled a full assessment report, and in May of 2005, KHJL farmers received their FSC certification.

In 1970, the Indonesian government appropriated large chunks of land from villages in South Konawe District in Southwest Sulawesi, and then hired local villagers to establish teak plantations on the very land that had just been taken from them. In response, the villagers stashed a few teak seeds in their pockets and brought them home to plant in their fields and gardens.

Teak has always been highly valued for its unique properties. This demand for teak has put enormous pressure on government plantations and tempted many of South Sulawesi's poor to venture into the plantations to log illegally. Their gains have been few. Villagers who harvest and sell illegal teak find themselves at the mercy of middlemen, who pay notoriously low prices.

Illegal logging depletes the teak resource, removing long-term income potential. Without careful management, teak groves can quickly be degraded and the resource loses its value.

For those farmers in the KHJL, their homegrown trees, sprouted in private farm plots, are now proving a highly effective tool to combat illegal logging on state lands while providing villagers with a reliable source of income. Meeting the strict forestry standards of the FSC, means they can now command premiums high enough from their own teak plots to survive financially. As businesses are wary of procuring illegal teak and want traceability of the resource, their certified teak can access markets previously unavailable to the cooperative members.

FSC certification has enabled the teak farmers in these communities who were planting and replanting teak for decades to use the trees as an investment in the future of their children and grandchildren, and there is extra income for school fees, building and repairing of houses, medical expenses and marriage ceremonies.

SECTION 2:
Understanding the International Context

2.1. REDD Basics

Although REDD will likely be included in some manner in future international climate change agreements, the details of how a REDD mechanism might be incorporated have yet to be decided upon. Because of this, it is difficult to describe exactly what a REDD framework will look like and how it will work. Nevertheless, there are some basic components of REDD that will undoubtedly be incorporated in the final mechanism. This section will provide a brief overview of those key elements. This overview of the "building blocks" of REDD provides you with a general framework of a REDD mechanism in which you can fill in more details as you learn more about each component as the training proceeds. The building blocks of REDD include: carbon accounting, baselines, emissions reductions strategies, monitoring and verification, and the sale of emissions reductions. Various actors are involved in each of those processes either in the implementation, policy-making, or financing aspects. Figure 15 is a summary of those building blocks. Each of these elements will be discussed in more depth in subsequent sections. The chapter merely introduces each building block and provides a general framework for how they fit together.

Carbon Accounting

One of the main elements that make REDD projects unique from traditional forest protection strategies is carbon accounting. While many efforts to reduce deforestation may result in a net benefit to the atmosphere in the form of reduced greenhouse gases, a REDD strategy must explicitly quantify that benefit using recognized methodologies in order to receive compensation or acknowledgement of that benefit. For this reason, carbon accounting forms the base of our REDD building blocks. Carbon accounting includes using remote sensing data from satellites to measure and monitor land cover change and performing field inventories to measure the carbon density of forests in order to measure the net gain or loss of carbon in the forest system. The remote sensing data allows you to calculate annual deforestation rates in terms of the amount of forest area converted to other uses. Field inventories allow you to calculate the how much carbon is in the existing forest as well as any land use which replaces forest, such as agriculture. Combining these two sources of data allows you to calculate the annual carbon emissions rate. This calculation is the basis for determining your baseline.

Baselines

The fundamental challenge for REDD mechanisms is to demonstrate "additionality." Additionality is simply defined for REDD as "greenhouse gas emission reductions that are additional to what would have occurred without the REDD mechanism." A baseline is the level of carbon emissions that would have occurred in the absence of the financial mechanism and field interventions. The simplest method for calculating a baseline is using an average of historic annual emissions over the past 5, 10, or 15 years (known as a 'reference period'), or just using a single recent annual emissions level. More complex methods involve projections of future emissions using models based on some combination of historic emissions, trends in emissions rates, and the expected behavior of the drivers of deforestation such as agricultural markets or infrastructure planning. The baseline is a key component of a REDD mechanism because emissions reductions credits are generated based on performance against the baseline. Therefore, a credible baseline is very important for determining how much financial compensation a country or project may receive.

Emissions Reductions Strategies

In order to receive incentives from a REDD mechanism, a country or project must actually reduce emissions from deforestation or forest degradation. In order to reduce emissions, strategies must be implemented that effectively address the drivers of deforestation or degradation in the project area. Strategies used in a REDD mechanism may be the same or similar strategies that land managers and conservationists have used for decades to address deforestation. We discussed some of these strategies in the previous chapter. The key is that the strategies must credibly and verifiably reduce emissions, they must be additional to actions that would have occurred in the absence of REDD financing, and they must provide for permanent forest protection. Examples of strategies that can be used in a REDD project include: establishment of protected areas, improved forest management, stopping or reducing forest fires, practicing reduced impact logging, undergoing forest certification, or ensuring that land conversion occurs in degraded areas rather than in intact forest land.

Monitoring and Verification

Emissions reductions made through a REDD project or program should be verified by an independent third party verifier. There are various companies that perform verification services. In the case of project activities, the verification process involves a review of the Project Design Document (PDD) and the methodologies used in the project. This includes an assessment of the project's additionality, baseline, monitoring plan, and environmental and social impacts. Through the verification process, emissions reductions achieved by a project will be certified, at which point they can be sold, traded, or retired. Both satellite and on-the-ground monitoring will need to continue throughout the life of the project to ensure that emission reductions are permanent.

Sale of Emissions Reductions

Once the emissions reductions from a project have been verified and certified, they can be offered for sale either through a carbon market, to a private buyer, or in exchange for donations made from a public fund. Transactions of carbon credits will generally be recorded in a carbon registry in order to avoid credits being sold more than once.

The sale price of the credits will depend on the demand and supply of credits, as well as on the quality of credits for sale and the needs of the buyer.

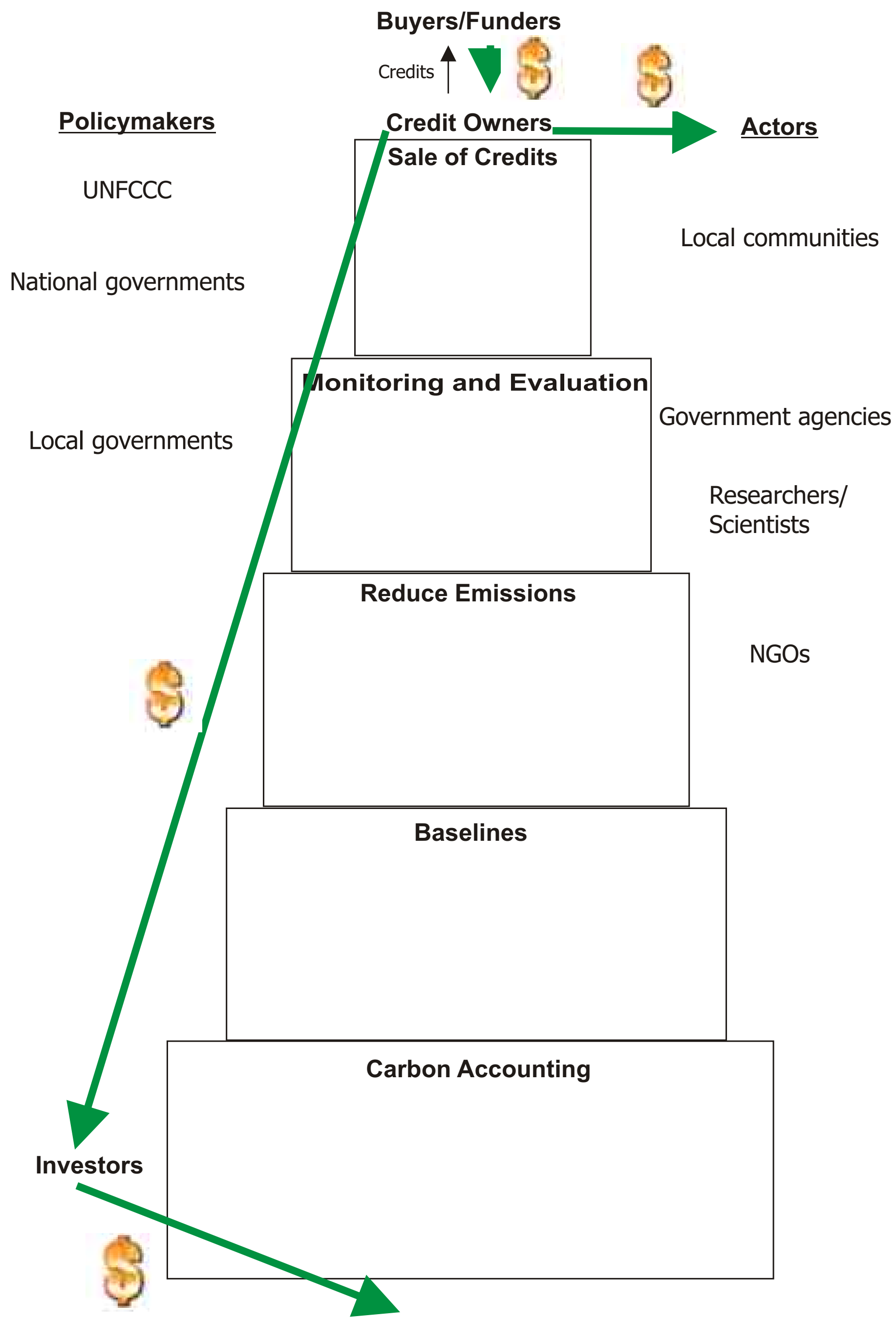
Financial Flows

The financial flows involved in financing REDD projects or programs will be complex and will depend on the specific country and actors involved. For explanation purposes, we will simply illustrate some basic financial flows. First, the project or program will require some up-front financing from an investor. That financing will cover some of the costs associated with the design of the project, the calculation of the baseline, and the start-up costs for field activities. Once the project or program has moved through all of our building blocks, credits will be available for sale. The owner of the credits (the project developer, land owner, or the government depending on the scale of the mechanism) can sell those credits on the voluntary carbon markets (or potentially in compliance markets in the future) and receive payments. Alternatively, compensation may be granted to the credit owner from a designated fund, if the REDD mechanism is fund-based rather than market-based. The money received for the credits will need to be distributed back to the initial investors and to the actors on the ground involved in the implementation of emission reduction strategies.

Actors Involved in REDD

REDD projects and programs will involve many stakeholders, and these stakeholders will vary depending on the design of the mechanism and the location. In general, stakeholders include: international policymakers, national governments, local governments, project developers, local communities, buyers, research institutions, local and international NGOs, and government agencies. Various actors will be involved in the financing of REDD, the implementation of REDD, or the design of REDD policies; some actors maybe involved in multiple aspects of a REDD mechanism.

Figure 15 : The building blocks of REDD



2.2. Technical Elements of REDD

In this chapter we will explore the key technical concepts that apply to GHG mitigation and how they apply to REDD approaches – carbon accounting, additionality, baselines, leakage, and permanence. These concepts are integral parts of a REDD approach and they are what makes REDD unique from traditional approaches to forest conservation. These elements are fundamental components to climate change mitigation, regardless of whether for voluntary or mandatory carbon regimes, and present in nearly all of the standards and/or best practice/guidance for approaches to climate.

This chapter focuses on defining and describing the terms and concepts. Means to address each issue will be discussed in more depth in the context of the national and project-level case studies presented later.

Carbon Accounting

The fundamental thing that makes REDD unique to traditional approaches to forest conservation is that financing for forest protection is based on carbon accounting. As discussed in the previous chapter, carbon accounting is a fundamental building block of REDD. Here we will explore the concept in more detail.

The basic steps involved in carbon accounting are as follows:

1. Use remote sensing (satellite) data to calculate the area of intact forest and degraded forest and to monitor how that area changes each year
2. Using that remote sensing information, calculate the annual area of deforestation and degradation
3. Calculate the carbon density of each forest type using field data and remote sensing data
4. Combine information from steps 2 (annual deforestation and degradation) and 3 (carbon density) in order to determine the annual carbon emissions from deforestation and forest degradation
5. Use annual emissions data (step 4) to calculate a baseline scenario
6. Continue to measure and monitor emissions after REDD activities have been implemented in order to determine emissions reductions below the baseline scenario

The technology and methodologies for performing carbon accounting for emissions from deforestation and degradation in tropical forests exists. Two sources of data are needed to perform carbon accounting: remote sensing and field inventories.

Remote Sensing

Satellite technology allows us to observe forest cover from space. Using satellite pictures, we can therefore monitor areas where forests remain intact, where they have been degraded by logging or other activities, and where they have been converted to other uses. This technology means that we can monitor changes in forest cover from year to year and therefore calculate annual deforestation and degradation.

Although there are still a few limitations of satellite-based monitoring approaches for REDD, the existing approaches have already been demonstrated to be practical for determining baseline deforestation rates against which future rates of change can be assessed.

Satellite monitoring of changes in carbon stocks has advanced substantially in recent years, with the development of new data mining techniques and the advent of a range of new (and planned) satellite sensors that provide unique information about vegetation structure and aboveground biomass. Today, a wide range of optical, radar, and lidar satellite sensors with high, medium, and low resolution, are available to inform tropical forest monitoring efforts, and new satellites specifically designed for biomass mapping will become operational within the next few years.

In addition to advances made in measuring and monitoring deforestation, methods to map and monitor forest degradation, in which only a portion of the forest stock is removed, have also been developed that allow large-scale and relatively cost-effective monitoring of selective logging activities. Semi-automated degradation mapping is under development, and has been demonstrated to be a reliable method to further reduce the cost of degradation monitoring when tailored to specific conditions.

GOFC-GOLD, a working group on earth observations for REDD, has produced a sourcebook to identify methods for monitoring and carbon stock assessments. The book emphasizes the role of satellite remote sensing as an important tool for monitoring changes in forest cover, and provides clarification on the IPCC Guidelines for reporting changes in forest carbon stocks at the national level.

Field Inventories

Time-tested, proven tools for field inventory of forest carbon exist. The basic field methodologies developed by forest and soil scientists over centuries to quantify the amount of biomass (and therefore carbon) stored in a forest are well-tested and accepted by climate scientists including those from the Intergovernmental Panel on Climate Change (IPCC). The basic steps in field inventories include:

- Determine the appropriate number of sample plots in different forest strata (using appropriate stratification methods)
- In each sample plot, identify tree species and measure the height of trees and the diameter of the tree at breast height
- Depending on the carbon pools to be included, also measure the amount of non-tree vegetation, dead wood and litter, and take soil measurements

The **IPCC Good Practice Guidance for Land Use, Land Use Change, and Forestry** (IPCC GPGs) provides reliable methods for estimating, measuring, monitoring and reporting on carbon stock changes and greenhouse gas emissions from land use, land use change, and forestry activities. The UNFCCC recognizes that IPCC guidelines and guidance should be used to provide needed data for implementing REDD.

Additionality

Carbon accounting is necessary in order to prove that emissions from deforestation and forest degradation have, in fact, been reduced through the implementation of effective strategies. But the question remains, emissions have been reduced compared to what? This question takes us to our next concept, additionality, which is integrally linked to our third concept of baselines.

The fundamental challenge for REDD mechanisms is to demonstrate "additionality." Additionality is simply defined for REDD as "carbon emission reductions that are additional to what would have occurred without the REDD mechanism." In order to provide real climate change mitigation, emission reductions financed through carbon markets must be additional. To be additional, nations or projects claiming REDD credits must show that reduced deforestation rates attributed to the project would not have occurred in the absence of carbon finance.

Additionality cannot be measured exactly, thought there are suggested tests for determining whether emission reductions are additional:

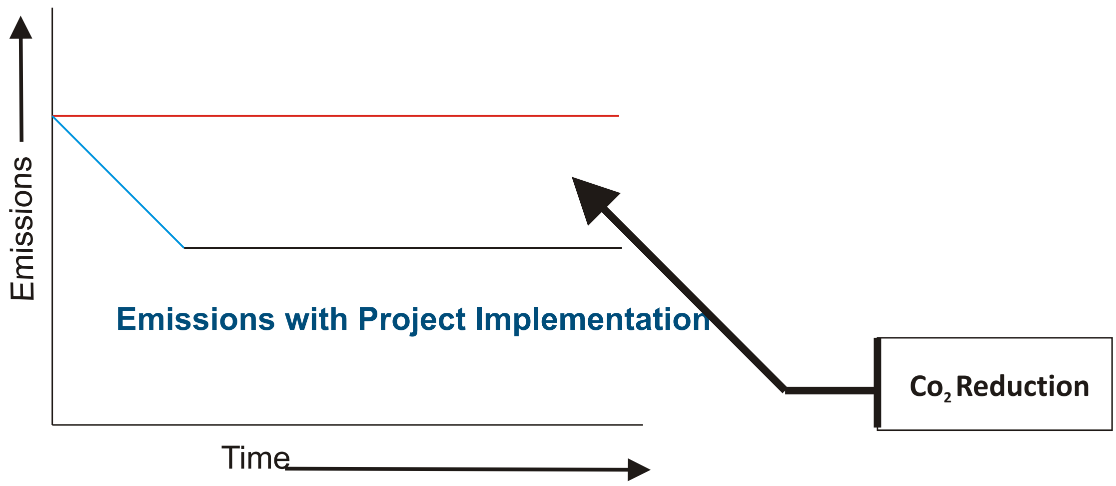
- *Baseline Test :* First and foremost, emissions reductions are generally considered additional if they are below an accepted baseline representing the expected emissions in the absence of REDD interventions. In other words, emissions must be reduced against a 'business-as-usual' scenario. Baselines will be discussed more in depth later on.
- *Legal Test:* A second common category of additionality test is whether or not the activities are required by any legal regulations or compliance codes of practice. If the law requires something to be done, then doing it is not additional – it is merely complying with the law. Exceptions may be:
    - If the REDD mechanism is instigated by the national government in agreement with international commitments – new laws pertaining to REDD become part of the legal framework.
    - In many developing countries, legal requirements are not met on such a grand scale that to meet the law is actually 'additional' to common and regular practice. (An example of this would be the many 'paper parks' in tropical countries which are lands protected by law but whose forests are subject to unchecked deforestation due to a lack of enforcement of the law.)
- *Financial Test:* Another test of additionality is a **financial** test. This is typically a demonstration that a carbon investment or activity would have a low or unacceptable internal rate of return without carbon finance. Thus the funds generated by climate mitigation are the reason for undertaking activities that would otherwise be commercially unattractive.
- *Common Practice Test:* Another type of test is called **'common practice'**. This means that practices routinely adopted and commonplace within a sector are not additional.

Emission Reference Rate (Baselines)

When attempting to determine whether activities are additional or not, the reference point or basis for measurement will be the "Business as usual" or "Without project" scenarios. These present the basis to measure project impact. The reference emissions scenario, or baseline, is the level of carbon emissions that would have occurred in the absence of the financial mechanism; it is the 'business as usual' scenario.

Figure 16 represents a very basic baseline. The red line shows the emissions that would occur if no action is taken and things continue as usual (it is the baseline). The implementation of a project that reduces emissions is represented by the blue line, which shows the new emissions that will occur as a result of the project. The difference between the red line (the baseline) and the blue line (emissions as a result of the project) is the emission reduction that the project achieved.

Figure 16 : A Baseline



The simplest method for calculating a baseline is using an average of historic annual emissions, or just using a single recent annual emissions level. More complex methods involve projections of future emissions with models based on some combination of historic emissions, trends in emissions, and drivers of deforestation. Baselines from simple historic emissions calculations are often favored because they are based on measurable, empirical data and are easy to understand. However, simple historic baselines could create perverse incentives by encouraging higher rates of deforestation prior to the implementation of a REDD strategy, particularly for countries with currently low rates of deforestation and high remaining forest. To address this, a hybrid approach to baseline setting may be needed, under which the methodologies for determining a baseline would depend on the circumstances of individual countries.

Setting reference levels is highly political because it directly determines how much income a country is able to gain from carbon trading. Therefore, countries have an incentive to inflate their baselines to a higher level than what would have realistically occurred in the business-as-usual scenario in order to claim more credits from emissions "reductions" (resulting in 'hot air'). On the other hand, if a baseline is set too conservatively (i.e. much lower than the actual rate of emissions), countries may not have enough incentive to reduce emissions below that baseline, as reductions below that level would be more difficult and expensive to achieve. Discussions will need to establish reference levels that are environmentally stringent but also account for national circumstances and the dynamics of deforestation. As payments are made for REDD, baselines should decline over time to reflect the declining stocks of forest carbon that remain to be sold.

Leakage

Two additional concepts, leakage and permanence, are integrally linked with carbon accounting, additionality, and baselines. The IPCC's Special Report on Land Use, Land-Use Change, and Forestry defines leakage as "the unanticipated decrease or increase in GHG benefits outside of the project's boundary…as a result of project activities." Although leakage can be positive, in the context of REDD, much of the concern is over the negative leakage in which reducing deforestation in one area would simply shift the deforestation activity to another area.

As a result, benefits from a REDD project would be diluted by increased deforestation and increased emissions elsewhere such that there would be little or no net decrease in emissions at the national or global scale. Although leakage is a concern when considering REDD, leakage can occur in any sector affected by GHG mitigation. For example, GHG regulations in one country could drive energy-intensive industries to unregulated countries. Leakage can be minimized and/or accounted for in REDD activities.

There are two forms of leakage that REDD activities are susceptible to: activity leakage and market leakage:

- **Activity leakage** occurs when the activity that caused the deforestation in a project area is displaced to a different location outside the boundaries of the project area. For example, farmers inside a conservation project area might shift operations and clear forests outside the project area. Activity leakage can largely be controlled at the project level through project selection and project design measures that address both the proximate causes of leakage (land-use change and forest conversion) and the underlying drivers (e.g., poverty, agricultural policies, and land tenure).
- **Market leakage** occurs when a project or policy changes the supply-and-demand equilibrium, causing market actors to shift. For example, if a project decreases timber supply, prices will rise, which will be met by increased supply (and increased deforestation) from outside the project area. Risk of market leakage will depend on the drivers of deforestation, demand elasticity, availability of substitutes, and the ability for other operators to intensify their production. Market leakage is not easily controlled but can be measured, modeled, and accounted for through discounting credits according to the estimated leakage.

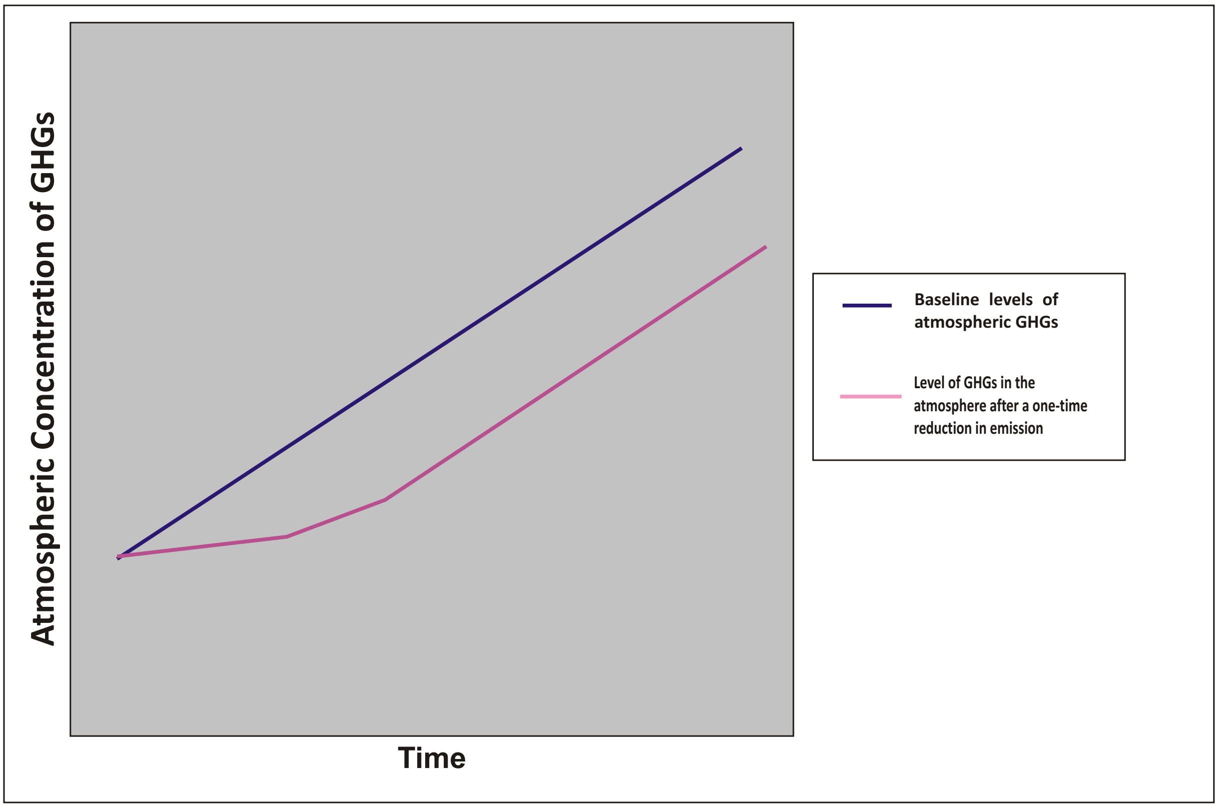
The risk of leakage changes depending on the scale of a REDD mechanism. Under a project-based REDD policy, the risks of in-country leakage would have to be accounted for when issuing credits. Project leakage can be modeled and accounted for either before or after it has occurred. Under a national-based REDD policy, in-country leakage is not an issue as it is incorporated into the national accounting and credit generation. International leakage would still be an issue; however, it may be impractical to account for international leakage because a participating country cannot be penalized for the inability of another country to resist deforestation pressure. The UNFCCC currently does not require any sectors to account for international leakage. In general, higher levels of participation internationally would reduce leakage as there would be fewer countries that would allow deforestation to leak into their borders.

Permanence

When considering whether an emission reduction is permanent, the underlying question is whether the levels of GHGs in the atmosphere are permanently lower than they would have been in the absence of policy. Permanence is thus determined both by the rate of emissions and the amount of carbon dioxide in the atmosphere. To illustrate this, suppose an individual replaced his eight cylinder car with a hybrid vehicle (gas and electric) and avoided twenty tons of emissions over the life of the vehicle. Then suppose that when the hybrid dies the individual switches back to driving an eight cylinder car. Figure 17 shows impact of this one-time use of a fuel-efficient car on the amount of carbon dioxide in the atmosphere.

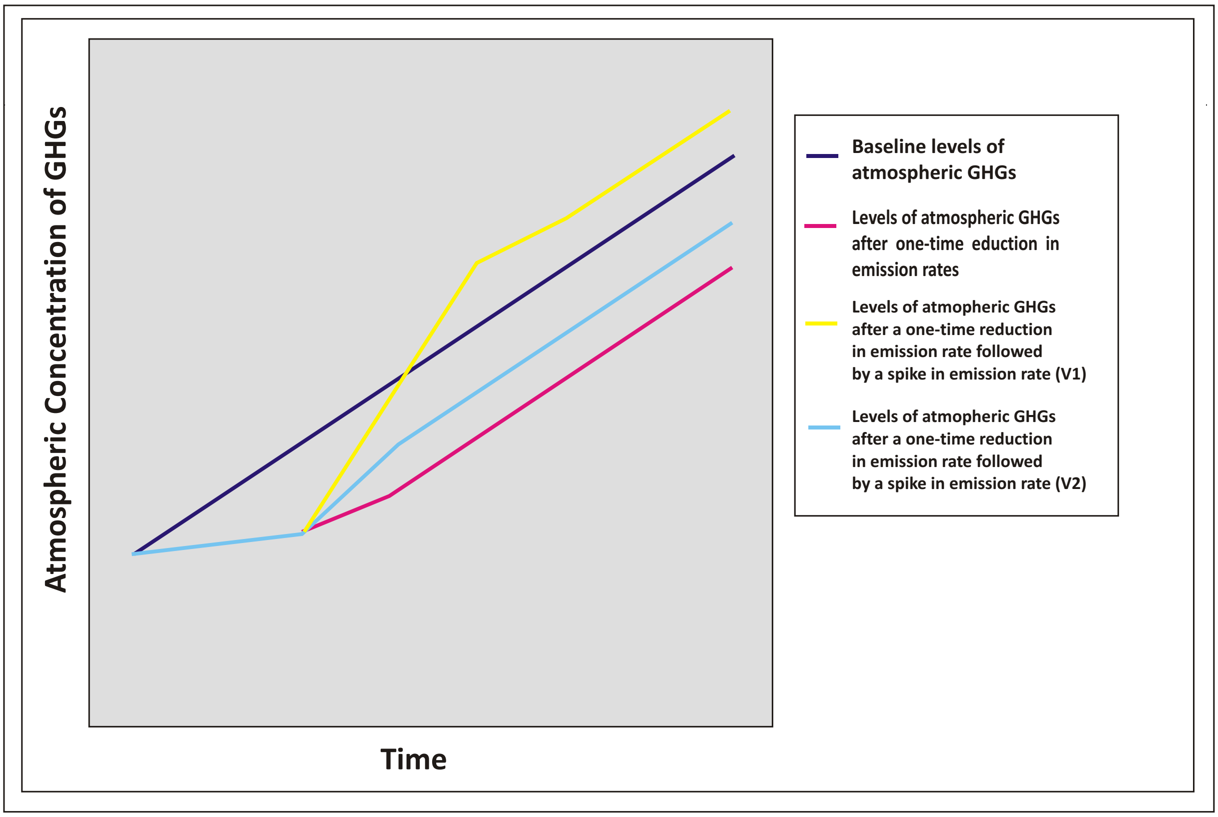
After the one-time reduction in emissions, GHG levels continue to increase, but are permanently lower than they would have been if the fuel-efficient vehicle had never been used. Therefore, although the reduction in fossil fuel consumption is temporary, the amount of carbon dioxide in the atmosphere is permanently lower. This example can also be applied to tropical forests to understand how a one-time reduction in deforestation rates could lead to a permanent reduction in the amount of carbon dioxide in the atmosphere.

Figure 17 : Impact of a one-time reduction in emissions



In the above example, reductions in the carbon stocks in the atmosphere would be permanently reduced as long as the baseline rate of emissions was not exceeded. For example, if, after the individual switches back to her eight cylinder car, she chooses to make up for lost time by taking off-road trips every weekend, she may exceed her original emissions rate and compromise the reductions she had made with the hybrid. The yellow line (v1) in Figure 18 illustrates this point. In this scenario, the individual exceeds her baseline rate of emissions after returning to the eight cylinder car and any reductions achieved were lost. The turquoise line in Figure 18 (v2) represents a scenario in which the individual's emission rates spike up after the one-time reduction, but not to the extent that her baseline rate is exceeded. In this scenario, there is a permanent benefit to the atmosphere, but it is lower than it would have been without the spike. These scenarios could also apply to emissions reductions from avoided deforestation.

Figure 18 : Impact of a one-time reduction in emission rates followed by a spike in



Thus, the question of whether a reduction in deforestation emissions has different characteristics than a reduction in fossil fuel emissions (and therefore merits special treatment) depends on whether future emissions rates from deforestation are more likely than fossil fuel consumption to spike above the baseline after a reduction in emissions rates.

In a system based on project-based REDD programs, one can imagine that the carbon benefits of one forestry project could be reversed as a result of burning, forest conversion, or other activities that would release that carbon previously stored in the forests. One such incident could produce a deforestation spike of such great magnitude that it would render void all previous benefits and carbon stocks in the atmosphere would return to the baseline scenario. However, in a system of national-based REDD programs, a spike in deforestation rates is less likely because a national government would manage a portfolio of REDD policies and projects and would reduce emissions rates across all of these projects. An unforeseen incident in one project could be balanced with adjustment of land-use practices in another area to achieve the desired level of emissions reductions nationally. In order to create a spike in emissions and undo a previous period of low deforestation, routine events occurring in the baseline scenario – which likely includes burning, forest conversion, and other activities – would have to occur at rates higher than the baseline rate. This may or may not be very likely to occur, depending on the area in question.

Although emissions reductions from avoided deforestation are arguably as permanent as reductions in the fossil fuel sector, investors and policymakers may need some form of insurance against the perceived extra risk that emissions reductions from avoided deforestation might be reversed through unforeseen or uncontrollable events. There are numerous options for providing that insurance.

The Voluntary Carbon Standard (VCS) provides one promising way of guarding against the risk of impermanence, known as the "buffer" approach. The VCS created a rating system to determine a REDD project's overall permanence risk. That rating is then used as guidance for determining the appropriate amount of credits that should be held in reserve account as a buffer against impermanence. If the emission rate of the project increases above the baseline, the VCS releases credits from the reserve account to make up for excess emission, ensuring that any credits already issued do in fact continue to represent real, permanent reductions. A national REDD system could incorporate a similar approach, holding some quantity of emissions reductions in reserve in case of unforeseen events.

Another suggested means of dealing with impermanence is temporary crediting. Temporary REDD credits would be valid for one or more commitment period(s), after which they would expire and new credits would be issued if re-verification showed that deforestation rates stayed below the baseline rate. Increases in deforestation rates would be met with decreases in the number of credits issued. In the case of decreased credits, the buyer would be responsible for finding a new source of emissions reductions. Temporary credits have had limited success in the CDM market because of their lower price, lack of fungibility with permanent credits, and uncertainty about future values. Temporary REDD credits would likely face similar issues.

Conclusion

This chapter defined and explained five key technical elements of climate change mitigation and how these are dealt with in REDD: carbon accounting, additionality, baselines, leakage, and permanence. These concepts are integral parts of a REDD approach and they are what makes REDD unique from traditional approaches to forest conservation. In upcoming chapters, you will explore how these elements are integrated and dealt with in real-world REDD activities.

2.3. International REDD Policy Context

Historical Policy Context – The Forming of the UNFCCC

Over 15 years ago, the world came together at the Earth Summit in Rio de Janeiro to discuss a global framework for international efforts to tackle climate change. Recognizing that the climate system is a shared resource whose stability can be affected by emissions of greenhouse gases that result from the actions of people, the group created the United Nations Framework Convention on Climate Change (UNFCCC). The Convention sets an overall framework for intergovernmental efforts to tackle the challenge posed by climate change. It recognizes that climate change is a global problem that requires a global solution. The aim of the Convention is:

> *"to stabilize atmospheric concentrations of greenhouse gases at a level that would prevent human-induced actions from leading to dangerous anthropogenic interference with the global climate system."*

It further states that:

> *"such a level should be achieved within a time-frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure food production is not threatened, and to enable economic development to proceed in a sustainable manner."*

The Convention also seeks to:

> *"cover all relevant sources, sinks, and reservoirs of greenhouse gases."*

The UNFCCC has been ratified by 192 countries and it entered into force on March 24, 1994. The United States was the first developed country to ratify the Convention. Figure 19 provides a timeline of key events that have occurred in the UNFCCC process.

Box 6 : The Structure of the UNFCCC

The supreme body of the Convention is its *Conference of the Parties* (COP). It meets every year to review the implementation of the Convention, adopt decisions to further develop the Convention's rules, and negotiate new commitments. Two subsidiary bodies meet at least twice a year to steer preparatory work for the COP:

- *The Subsidiary Body for Scientific and Technological Advice* (SBSTA) provides advice to the COP on matters of science, technology and methodology, including guidelines for improving standards of national communications and emission inventories.
- *The Subsidiary Body for Implementation* (SBI) helps to assess and review the Convention's implementation, for instance by analyzing national communications submitted by Parties. It also deals with financial and administrative matters.

Two additional working groups under the Convention were formed in 2005 and 2007:

- *The Ad-hoc Working Group on the Kyoto Protocol* (AWG-KP): discusses further commitments of industrialized countries under the Kyoto Protocol for the period beyond 2012
- *The Ad-hoc Working Group on Long-term Cooperative Action* (AWG-LCA): established in Bali in 2007 to conduct negotiations on a strengthened international deal on climate change

Figure 19 : Timeline of Key Event in Climate Change Policy

Convention Timeline	
2007	DEC : **COP 13 and CMP 3 (Bali Indonesia)**
	SEP : **High-Level Event on clmate change, UN Headquarters (New York, USA)**
2006	NOV : **COP 12 and COP / MOP 2 (Naerobi, Kenya)**
	Naerobi work programme on adaption
2005	NOV / DEC : **COP 11 and COP / MOP 1 (Montreal, Kanada)**
	FEB : **Entry info force of Kyoto Protocol**
2004	DEC : **COP 10 (Buenos Aires, Argentina)**
	Buenos Aires Programme of work on adaption and Response Measures
2002	OCT / NOV : **COP 8 (New Dehli, India)**
	AUG / SEP : **Progress since 1992 reviewed at wold Summit on sustainable Development**
2001	OCT / NOV : **COP 7 (Marrakesh, Morocco), Marrakesh Accords**
	JUL : **COP 6 resumes (Bonn, Germany), Boan Aggrements**
	APR : **IPCC Third Assessment Report**
2000	NOV : **COP 6 (The Hague, Netherlands), Talks based on the plan break down**
1998	NOV : **COP 4 (Buenos Aires, Argentina), Buenos Aires of plan action**
1997	DEC : **COP 3 (Kyoto, Japan), Kyoto protocol adopted**
1995	MAR / APR : **COP 1 (Berlin, Germany), Berlin Mandate**
1994	MAR : **Convention Enteres into force**
1992	JUN : **Convention opened for signature at Earth Summit**
1992	MAY : **INC Adopts UNFCCC text**
1991	**First Meeting of the INC**
1990	**IPCC and Second WCC call for global treaty on climate change**
	SEP : **United Nations General Assembly negotiations on a framework convention**
1988	**IPCC estabilished**
1979	**First Wold climate Converence (WCC)**

Source : UNFCCC. 2007. Uniting on Climate: A Guide to the Climate Change Convention and the Kyoto Protocol.

The Kyoto Protocol

Although its goal was very ambitious, the UNFCCC contained no activities that could actually achieve its aim. Rather, it laid out a process through which various protocols containing more specific commitments might be negotiated. The first of these protocols was negotiated at Kyoto, Japan in 1997. The major feature of the Kyoto Protocol is that is sets binding targets for 37 industrialized countries and the European Community for reducing greenhouse gas emissions. The targets amount to an average reduction of 5% against 1990 levels over the five-year period between 2008 and 2012.

Recognizing that developed countries are principally responsible for the current high levels of greenhouse gas concentrations in the atmosphere, the Kyoto Protocol divided countries into two categories:

- Annex I: Industrialized countries
- Non-Annex I countries: Developing countries

Under the protocol, mandatory limits on the emission of greenhouse gas (GHG) were placed on Annex 1 countries under the principle of *"common but differentiated responsibilities".* No binding requirements were placed on non-Annex I (developing) nations.

The division of countries has created great debate between and within the Annex 1 and non-Annex countries – principally around historical responsibilities. For instance emerging economies like Brazil, China, and India (non-Annex I countries) are not covered by any binding requirements to cut emissions, despite the fact that they are very large emitters of greenhouse gases.

The Kyoto Protocol entered into force in February, 2005. This is despite the United States not ratifying the Protocol claiming that the U.S. will not take on binding commitments unless China and other major emitters do as well.

Though the Kyoto Protocol has been criticized for doing little to combat global warming, for being economically inefficient, and for not committing the largest developing nations to binding reductions, it remains the only official global strategy for mitigating climate change. One of Kyoto's most significant accomplishments was the creation of a market for greenhouse gas emissions reductions.

The Kyoto Protocol set up an International Emissions Trading (IET) market which is a cap-and-trade system that allows Annex I countries to trade allowances with other Annex I countries. (Cap-and-trade systems will be explained in the next section). Two mechanisms were created under Kyoto to create flexibility in the market:

1) *Joint Implementation (JI)* - emission reduction projects located in Annex I countries can generate credits which can then be bought by other Annex I countries and used for compliance in a regulatory cap-and-trade system.
2) *Clean Development Mechanism (CDM)* **-** Annex I countries pay for credits from emissions reductions that occur within developing nations (non-Annex I) that have signed the Protocol. The purchasing Annex I nation may then use those credits for compliance in a regulatory cap-and-trade system.

The *Clean Development Mechanism* is the only means by which developing countries can participate in the Kyoto markets. It was introduced because the Parties recognized that the costs of greenhouse gas mitigation varied significantly between countries and therefore it would be more cost-effective to implement emissions reductions projects in countries where the costs were lowest. The CDM projects are also meant to contribute to the sustainable development goals of the developing country.

The Treatment of Forests in Climate Change Negotiations

The Kyoto Protocol set specific emissions targets for countries, but did not set rules on how to achieve those targets. The task of establishing rules was given to the Subsidiary Body for Scientific and Technological Advice (SBSTA) of the UNFCCC. Specific rules for achieving targets were developed in Marrakesh in 2001, including rules for how emissions from land use, land use change, and forestry (LULUCF) would be incorporated into the accounting system.

The inclusion of LULUCF has been controversial. Many have seen it as simply a way to offset emissions from the energy sector rather than as an additional means of greenhouse gas mitigation. Plus uncertainties in establishing baselines, project leakage and non-permanence added to the considerable debate over the inclusion of LULUCF in the Kyoto Protocol.

Regardless, the Kyoto Protocol requires Annex I countries to account for the carbon changes associated with afforestation, reforestation, deforestation and all land use activities undertaken since 1990. Developing countries can however only claim credits generated from afforestation and reforestation through the CDM **but not avoided deforestation**.

As almost 20% of global greenhouse gas emissions results from deforestation in developing countries this is now seen as a major omission from the Kyoto Protocol. A post-2012 agreement that includes Reducing Emissions form Deforestation and Forest Degradation (REDD) represents an opportunity to address this omission and create a system that includes all major sources of emissions, including those from deforestation and forest degradation.

New Proposals for Reducing Emissions from Deforestation and Forest Degradation (REDD)
The REDD concept was first introduced at ninth Conference of the Parties (COP-9) by a group of scientists who developed the mechanism as a national approach to reducing deforestation and called it "*compensated reductions*" [24]

The basic principle of the compensated reduction proposal is that countries would be compensated for measurable reductions in their deforestation rate compared to a historical national reference level of deforestation. If a country reduced its deforestation rate below this reference rate, it would generate credits that it could sell in the carbon markets. Conversely, if the country increased emissions from deforestation, it would be liable to reduce the related emissions accordingly in the second commitment period.
While initial participation would be voluntary, countries that have generated REDD credits would agree to maintain or further improve deforestation rates in the future.

At the UNFCCC at the 11th session of the Conference of the Parties (COP-11), Costa Rica and Papua New Guinea on behalf of the Coalition of Rainforest Nations[25] submitted an official proposal on REDD. This proposal was welcomed by most Parties because of its new focus on a national accounting approaches and the growing awareness of the contribution of deforestation to overall carbon emissions.

The submission at COP-11 launched a two-year process to design an effective REDD mechanism. This process has focused on the documentation and exchange of relevant scientific, technical, and methodological considerations and experiences, including policy approaches and positive incentives. Numerous proposals for REDD mechanisms have been submitted to the UNFCCC Subsidiary Body on Scientific and Technical Advice (SBSTA). The proposals differ in key ways, but all present approaches for payment for measurable, reportable, and verifiable (MRV) emission reductions from REDD activities. Table 6 summarizes some of the main proposals (though the table is not meant to be comprehensive). For a more comprehensive review of all of the proposals on the table, refer to The Little REDD Book, by the Global Canopy Programme, available at: **www.globalcanopy.org**.

---

[24]) Environmental Defense and the Instituto de Pesquisa Ambiental da Amazonia. 2007. *Reducing Emissions from Deforestation in Developing Countries: Policy Approaches to Stimulate Action.* Submission to the XXVI Session of the Subsidiary Body on Scientific and Technological Advice of the UNFCCC.

[25] **)** Reducing Emissions from Deforestation in Developing Countries: Approaches to Stimulate Action. Submission of Views to the UNFCCC COP 11 by Bolivia, Central African Republic, Costa Rica, Democratic Republic of the Congo, Dominican Republic, Fiji, Ghana, Guatemala, Honduras, Kenya, Madagascar, Nicaragua, Panama, Papua New Guinea, Samoa, Solomon Islands, and Vanuatu

Table 6: Summary of various REDD proposals

Proposal	Scale	Reference Level	Financing	Scope	Incentives for historically low emitters
Compensated Reductions[26]	National	Historic based on a period of 5-10 years	Market	Deforestation and degradation	Includes a stabilization fund and/or allows countries to negotiate a "growth cap"
Brazil[27]	National	Historic over a period of 4 years	Fund	Deforestation	None
JRC[28]	National	Historic based on the period from 1990-2005	Not considered	Deforestation and degradation (differentiates between intact and non-intact forest)	Global average emissions rate used
Nested Approach[29]	National and sub-national	Historic	Market	Deforestation and degradation	Allows them to participate through sub-national activities
Carbon Stock[30]	National and sub-national	Carbon stock reserve defined based on assessment of future threats	Market	Deforestation and degradation	Future deforestation rates and development objectives considered when defining the carbon stock reserve
Combined Incentives[31]	Global	Historic	Not considered	Deforestation and degradation	[Includes a 5-year adaptation period for countries with high rates of deforestation where they don't incur any debits]
Dual Markets Approach[32]	Not specified	Not specified	Separate, non-fungible market	Deforestation and degradation	Not specified
T-DERM[33]	National	Historic	Market-linked fund	Deforestation and degradation	Different funding programs for countries with different country circumstances
Stock-Flow[34]	Global/ national	Historic	Market and fund	Deforestation and degradation	Financing distributed based on reductions against historic emissions rates and based on existing carbon stocks
Terrestrial Carbon Group[35]	National and sub-national	Projected	Market and fund	Deforestation, degradation and enhancement	Provides incentives based on carbon stocks (not historic emission rates)

[26]) Environmental Defense and the Instituto de Pesquisa Ambiental da Amazonia. 2007. *Reducing Emissions from Deforestation in Developing Countries: Policy Approaches to Stimulate Action.* Submission to the XXVI Session of the Subsidiary Body on Scientific and Technological Advice of the UNFCCC.
[27]) Brazilian Perspective on Reducing Emissions from Deforestation. Submission to the UNFCCC SBSTA. 2006.
[28]) Mollicone, D., F. Achard, S. Federici, H. Eva, G. Grassi, A. Belward, F. Raes, G. Seufert, G. Matteucci, and E. Schulze. Avoiding deforestation: An incentive accounting mechanism for avoided conversion of intact and non-intact forests.
[29]) Joanneum Research, Union of Concerned Scientists, Woods Hole Research Center, and the Instituto de Pesquisa Ambiental da Amazonia. 2006. Reducing Emissions from Deforestation in Developing Countries: potential policy approaches and positive incentives.
[30]) Prior, S., R. O'Sullivan, and C. Streck. 2007. A Carbon Stock Approach to Creating a Positive Incentive to Reduce Emissions from Deforestation and Forest Degradation.
[31]) Strassburg, B., R.K. Turner, B. Fisher, R. Schaeffer. An Empirically-Derived Mechanism of Combined Incentives to Reduce Emissions from Deforestation. CSERGE Working Paper ECM 08-01
[32]) Oganowski, M. N. Helme, D. Movius, and J. Schmidt. REDD: The Dual Markets Approach. Center for Clean Air Policy [33]) Hare, B. and K Macey. 2007. Tropical Deforestation Emission Reduction Mechanism. Greenpeace.
[34]) Woods Hole Research Center and IPAM. 2008. How to Distribute REDD Funds Across Countries? A Stock-Flow Approach.
[35]) The Terrestrial Carbon Group. 2008. How to Include Terrestrial Carbon in Developing Nations in the Overall Climate Change Solution

Current Policy Context

The months leading up to COP-13 in Bali in December, 2007 saw a number of promising developments on climate change in the international community:

- The Fourth Assessment Report of the IPCC, adopted in 2007, provided the strongest evidence for man-made climate change and provided the strong message that decisive action was required;
- The IPCC and Al Gore were awarded the Nobel Peace Prize for their work on climate change;
- An unprecedented number of high-level diplomatic meetings dealing with climate change were held;
- A new Australian Government ratified the Kyoto protocol and promised to act strongly on climate policy;
- Developing countries were energized by the increased interest in adaptation and REDD; and
- Public expectations for a COP had never been so strong.

Debate in Bali was intense and emotional. Doubt remained until the last moment about a number of issues, including the phrasing of the decision on REDD. But the delegates at the Bali COP did call for the inclusion of REDD as part of a post-2012 mitigation strategy as well as conclusively stating that the technical capacity to accurately measure and monitor emissions reductions from reduced deforestation and degradation exists. They also called from demonstration activities and capacity-building for countries that may not be ready to engage in the mechanism by 2012. These were huge successes.

Another outcome from Bali was an agreement on a two year negotiating process known as the Bali Action Plan (or Bali Roadmap), which is to conclude at COP-15 in Copenhagen, in December, 2009. COP-14 in Poznan, Poland, was the mid-way point of that negotiating process. Expectations were low for Poznan and those expectations were largely met. While developing countries came to the table with tangible inputs, parallel policy process going-on in the US and Europe distracted developed countries from making similar advances. As a result, little progress was made. One concrete step that did come out of COP-14, however, was a mandate to the Chair of the Ad-Hoc Working Group on Long-term Cooperative Action (AWG-LCA) to create a negotiating text by June. This text will likely form the basis of any Copenhagen agreement. The process over the coming year will focus on identifying the elements that must be included in that agreement and defining how they will be included. This will require several weeks of intense negotiations throughout the year.

In addition to the regular semi-annual conferences of the UNFCCC, the Bali Action Plan will require a very active negotiating schedule of inter-sessional meetings and workshops prior to Copenhagen. Parallel to the UN negotiations in 2009 will be high-level processes including the G-8, a likely heads-of-state process convened by the UN Secretary-General, and regional political forums. While the UN should be the ultimate body where climate agreements are cemented and implemented, parts of the agreement may occur outside the UNFCCC process among smaller groupings of influential countries – perhaps directly engaging heads of state – and then be imported into the UN negotiations. Additionally, the international policy community will be closely following US legislation to see what decisions the US might take on certain issues in their domestic legislative processes.

Many issues surrounding REDD remain unresolved at this point in the negotiating process. These include: the scale of the REDD mechanism, the scope of the mechanism (deforestation, degradation, continued conservation, sustainable forest management, enhancement of carbon stocks, etc), how the mechanism should be financed, how baselines should be set, and how to deal with the social implications of the mechanism. Those issues, and others, are slated for further discussion in SBSTA and in the AWG-LCA. Final decisions on many of these issues will not be reached until COP-15 in Copenhagen in December, 2009.

Key Outstanding Policy Questions

Despite the progress made in Bali, a number of key political issues related to REDD are still under negotiation. This section will explore each of those issues in turn.

Scale : National versus Project-level

As discussed above, avoided deforestation activities were excluded from the Kyoto Protocol due to concerns about leakage and other related issues. New proposals for REDD have focused on a national-level approach to crediting avoided deforestation and have therefore gained support. The main policy issue under discussion is whether projects undertaken outside of a national accounting framework can earn credits to sell on the international carbon markets or can directly receive funding from an international REDD fund. Proponents of crediting projects see projects as a way for countries to build capacity to eventually create national accounting frameworks. Additionally, investing directly in projects is often more important to private investors because it is more transparent than investing money in a national government initiative. Opponents of crediting projects state that projects face greater challenges with addressing leakage and permanence than national-level approaches and that engaging in REDD solely at the project level will not lead to the large-scale policy reforms needed to fully address the problem of deforestation. There are many advantages and disadvantages to each approach, and the approaches are not mutually exclusive. Hybrid approaches, or time-bound step-wise approaches are possible.

Under a hybrid approach, the national government could set up a national accounting framework and establish a nationwide monitoring system. Meanwhile, implementation of REDD activities could occur at the project-level lead by NGOs, local governments, or communities. These projects would account for emission reductions at the project level. Incentives could be granted to the national government based on performance against the national baseline. The government would then distribute payments to each project based on performance against the project baseline. This is one way of creating a hybrid approach.

Time-bound or step-wise approaches are also possible. In a time-bound approach, projects could earn credits or receive direct investment outside of any national level accounting framework for a set time period. After that time period, the country would be expected to set up a national accounting framework and projects would no longer be credited outside of this framework. In a step-wise approach, projects could earn credits or receive direct investment outside of any national level accounting framework until a threshold number of projects or size of land area was reached. At that point, the country would need to create a national accounting framework that would envelop all the projects.

This issue is very complex, but it is central to the design of a successful mechanism. We delve more deeply into the issue in section 3.1.

Scope : What activities should be included in a REDD mechanism?
Initial proposals for a REDD mechanism focused on addressing deforestation. However, forest degradation is also a major source of emissions. Degradation of forests involves activities that reduce the carbon in forests, without converting the forest to other uses. Logging, for example is one source of forest degradation. (Deforestation, on the other hand, involves removing the trees and converting the land to another use, such as agriculture.) In some countries, forest degradation is a larger source of GHG emissions than deforestation. Therefore, the inclusion of degradation in a REDD mechanism will more fully address emissions from this sector. But measuring degradation may require a greater investment in ground-based measurement, which can significantly increase technical demands and costs. Some are concerned that including degradation in the mechanism may complicate monitoring efforts and increase the need for capacity building. They are thus afraid that including degradation in the mechanism from the start may bog down progress and delay the adoption of a mechanism.

In addition to the question of including reduced degradation in the mechanism, some countries have begun to advocate for the inclusion of other forestry activities. Countries that are in the process of reforestation would like to be able to take advantage of the financial flows that a REDD mechanism may generate and therefore advocate that reforestation should also be included as a viable mitigation method under a REDD mechanism. Additionally, some countries are neither deforesting nor reforesting, but are maintaining their existing forests. These countries state that they should get credit under a REDD mechanism for maintaining those carbon stocks, even though such conservation may not be additional to business-as-usual. There are advantages and disadvantages to including multiple types of forestry activities within one mechanism, and the scope of a REDD mechanism will need to be determined through the political process of the UNFCCC.

Funding : Market and non-market approaches
Three main avenues have been proposed for financing REDD: a market-based approach, a market-linked approach, and a non-market based approach.

Under a market-based approach, REDD activities would generate credits that could be traded in international carbon markets. Companies or entities that face emissions reductions commitments under a cap-and-trade system could buy REDD credits to meet part of those commitments. Proponents of a market-based REDD mechanism emphasize the huge potential revenue generation of the carbon markets. A market-based mechanism is considered by many to be the only means of raising sufficient funding to make meaningful reductions in deforestation in developing countries. Opponents of market based mechanism are concerned that including REDD credits in the current market may significantly disrupt that market with unpredictable volumes of credits or substantially lower prices, or may reduce the incentives for Annex-I countries to meet their commitments domestically. Recent studies have indicated that including REDD in carbon markets will have only a modest impact on carbon prices.

A market-linked approach is one in which revenues for REDD financing are generated through a tax on market transactions that would be used to create a “REDD fund” or by designating a certain portion of revenue from the sale of allowances for financing REDD. The latter option, known as a 'set-aside,' has gained some support recently.

Proponents of this approach see it as a way to generate substantial revenue for REDD while not interfering with carbon prices within carbon markets. There are numerous competing demands on allowance revenue, however, and it will be very difficult politically to ensure that a set-aside will generate sufficient revenue to truly address the problem. The set-aside could be one good option within a basket of funding approaches to REDD.

A non-market-based approach to REDD could include a number of funding sources, such as increased official development assistance (ODA), taxes on carbon intensive commodities or services, and multilateral donor funds. Proponents of non-market based approaches see REDD credits as incompatible with carbon markets due to their various technical challenges. A fund-based mechanism could incentivize projects without requiring the technical rigor that a market mechanism would require since the projects would not be offsetting any Annex-I emissions. There is doubt, however, that this type of mechanism could raise sufficient, long-term, and stable funding for REDD.

The various financing approaches are not mutually exclusive. A mixture of funding mechanisms, such as donor funds for readiness activities and up-front implementation in conjunction with a market for verified reductions that result could be possible. This issue will be dealt with over the coming year in the AWG-LCA discussions on REDD.

In addition to the question of including reduced degradation in the mechanism, some countries have begun to advocate for the inclusion of other forestry activities. Countries that are in the process of reforestation would like to be able to take advantage of the financial flows that a REDD mechanism may generate and therefore advocate that reforestation should also be included as a viable mitigation method under a REDD mechanism. Additionally, some countries are neither deforesting nor reforesting, but are maintaining their existing forests. These countries state that they should get credit under a REDD mechanism for maintaining those carbon stocks, even though such conservation may not be additional to business-as-usual. There are advantages and disadvantages to including multiple types of forestry activities within one mechanism, and the scope of a REDD mechanism will need to be determined through the political process of the UNFCCC.

Funding: Market and non-market approaches

Three main avenues have been proposed for financing REDD: a market-based approach, a market-linked approach, and a non-market based approach.

Under a market-based approach, REDD activities would generate credits that could be traded in international carbon markets. Companies or entities that face emissions reductions commitments under a cap-and-trade system could buy REDD credits to meet part of those commitments. Proponents of a market-based REDD mechanism emphasize the huge potential revenue generation of the carbon markets. A market-based mechanism is considered by many to be the only means of raising sufficient funding to make meaningful reductions in deforestation in developing countries. Opponents of market based mechanism are concerned that including REDD credits in the current market may significantly disrupt that market with unpredictable volumes of credits or substantially lower prices, or may reduce the incentives for Annex-I countries to meet their commitments domestically. Recent studies have indicated that including REDD in carbon markets will have only a modest impact on carbon prices.

A market-linked approach is one in which revenues for REDD financing are generated through a tax on market transactions that would be used to create a "REDD fund" or by designating a certain portion of revenue from the sale of allowances for financing REDD. The latter option, known as a 'set-aside,' has gained some support recently. Proponents of this approach see it as a way to generate substantial revenue for REDD while not interfering with carbon prices within carbon markets. There are numerous competing demands on allowance revenue, however, and it will be very difficult politically to ensure that a set-aside will generate sufficient revenue to truly address the problem. The set-aside could be one good option within a basket of funding approaches to REDD.

A non-market-based approach to REDD could include a number of funding sources, such as increased official development assistance (ODA), taxes on carbon intensive commodities or services, and multilateral donor funds. Proponents of non-market based approaches see REDD credits as incompatible with carbon markets due to their various technical challenges. A fund-based mechanism could incentivize projects without requiring the technical rigor that a market mechanism would require since the projects would not be offsetting any Annex-I emissions. There is doubt, however, that this type of mechanism could raise sufficient, long-term, and stable funding for REDD.

The various financing approaches are not mutually exclusive. A mixture of funding mechanisms, such as donor funds for readiness activities and up-front implementation in conjunction with a market for verified reductions that result could be possible. This issue will be dealt with over the coming year in the AWG-LCA discussions on REDD.

Reference Emission Levels

Setting reference levels (baselines) is highly political because it directly determines how much income a country is able to gain from carbon trading. Therefore, countries have an incentive to inflate their baselines in order to claim more credits from emissions "reductions." Discussions will need to establish reference levels that are environmentally stringent but also account for national circumstances and the dynamics of deforestation. There are many options for establishing a reference scenario, but the two most often discussed are historical reference levels and projected baselines. A projected baseline represents a model of the level of emissions that would have taken place in the absence of emissions reducing activities. Therefore an activity is "additional" if it reduces emissions below the projected level. Projected baselines are problematic since they are based on projections of the future rather than empirical data, and there is really no way of knowing what would have happened. Historical reference levels are established using the average deforestation rate for a country over historical multi-year periods. Baselines based on historic data are often preferred because they are based on actual data rather than a model and are therefore thought to be more credible. There are some problems with using purely historical baselines, however.

A REDD mechanism that uses strictly historical reference levels would fail to create incentives for countries that have historically low rates of deforestation. Setting a reference scenario based on the historical deforestation rates of those countries would not allow any room for them to generate credits from avoided deforestation and would therefore discourage their participation in the mechanism.

In order to avoid this, a projected baseline could be used that would take into account future pressures to deforest. Another option is to set a global reference rate and countries maintaining forest loss below this level could receive compensation. Finally, a separate fund could potentially be established to compensate these countries for maintaining their carbon stocks.

Social Safeguards

While a REDD mechanism has the potential to generate many benefits for local communities and Indigenous Peoples, there are also risks that those communities could incur as a result of the mechanism. These risks and benefits are discussed further in section 2.5. Indigenous Peoples and local communities need to be involved in the design and implementation of a REDD mechanism, but questions remain about how and to what extent they can be involved in UNFCCC negotiations. It is unclear how much detail on Indigenous Peoples and local communities can actually be included in an international mechanism, as these issues are usually dealt with at the national level. Additionally, while the involvement of local communities is essential to the success of a REDD mechanism, placing too many restrictions or requirements on the mechanism may result in inefficiencies and failures. A balance must be struck between ensuring the proper social safeguards are in place and creating an efficient and effective mechanism.

Biodiversity and other environmental impacts

REDD activities have the potential to create a number of environmental benefits additional to reducing GHG emissions. REDD activities may contribute to environmental benefits such as biodiversity conservation, water regulation, and reduced erosion. In the past, however, some payment for environmental services schemes have actually had negative environmental impacts due to inadequate consideration of the full implications of the program. In order to ensure that the environmental benefits of a REDD mechanism are in fact realized, some have advocated including specific language in any future agreement about how these environmental benefits will be maximized and risks minimized. Others are concerned that including goals outside of climate considerations will unduly burden the mechanism and bog down discussions. This issue is dealt with more in depth in section 2.6.

Conclusion

There are many technical and political issues related to REDD that are still under discussion in the UNFCCC negotiations. Over the course of 2009, many of these issues will hopefully be resolved and an efficient, effective, and equitable REDD mechanism can form part of a Copenhagen agreement. Outside of the policy negotiations, many countries are beginning to build capacity to engage in a REDD mechanism and others are implementing large-scale demonstration activities. Those activities offer the promise of feeding on-the-ground lessons about how REDD works into the policy discussions

2.4. Introduction to Carbon Markets

A carbon market results from a "cap-and-trade" system. Governments generally establish cap-and-trade systems to achieve reductions in pollutants at a lower overall cost to society than traditional command-and-control regulations. Carbon markets arise within cap-and-trade systems as a way for firms to trade emissions credits and thereby minimize their overall compliance costs. Carbon markets are based on the premise that certain companies will be able to reduce their greenhouse gas emissions at a lower cost than others. If those companies are able to sell excess emissions reductions to other companies, the overall cost of compliance with the system will be lowered.

How does a cap-and-trade system work?

A cap-and-trade system is a market-based mechanism in which a regulating body establishes a limit (cap) on emissions of a particular substance. The regulator then creates a number of "allowances" equal to the cap, and distributes these allowances to regulated entities through a variety of different ways. The regulated entities or sources must report on each unit of emissions they produce. Regulated sources may buy or sell allowances in order to fulfill their compliance obligations.

The basic components of a cap-and-trade system for CO2 are as follows:

- ***Cap :*** The regulating body passes a measure or law determining the cap and sources of the particular substance it will regulate.
  - The cap is typically based on the historic level of emissions from all regulated sources.
  - It may include reduction targets that regulated sources must achieve over a specified timeframe.
  - In the case of CO2, the cap would most likely be expressed in metric tons of CO2 equivalents (tCO2e). Emissions of other greenhouse gases (GHGs), such as methane, are converted to tCO2 according to their global warming potential in relation to Co2.

- ***Trade :*** One allowance is established for each ton of CO2e allowed to be emitted from covered sectors. Each allowance is a tradable commodity.
  - The regulating body may choose to give away all the allowances for free, auction off all the allowances, or adopt a combination of these approaches – giving away a portion of the allowances and auctioning the rest.
  - Every regulated source is required to submit enough allowances to cover its emissions at the end of each compliance period to the regulating agency.
  - Sources that do not have enough allowances to cover their projected emissions can either physically reduce their emissions, buy allowances on the market, or generate credits from emissions offset projects, if this is permitted.
  - Sources with excess allowances can sell them to other sources, or–in many systems–bank them to meet obligations in future compliance periods.

- ***Regulation :*** Monitoring of emissions and regulatory enforcement.
  - Regulated sources that fail to comply are subject to fines and penalties.

- Empirical evidence demonstrates that cap-and-trade systems have significantly lower administrative costs than traditional "command-and-control" policies.

- ***Goal :*** Allowance trading promotes cost-effectiveness in reducing emissions, while creating incentives for technological innovation and transition to less carbon-intensive sources of energy.

What is an offset and what role do offsets play in carbon markets?
Within a cap-and-trade system, an offset is an emission reduction that takes place outside of the regulated sector(s). Offsets can be issued for many conservation-oriented activities such as planting native trees on previously forested land (reforestation), reducing emissions from deforestation (avoided deforestation), and improved forest management. Non-conservation-oriented projects such as renewable energy generation and the capture and combustion of methane from landfills and coal mines, as well as agricultural manure management, are also activities that are eligible to generate offsets. Activities that measurably reduce emissions from those sectors could be eligible to sell offset credits.

Some advantages of allowing offset credits into carbon markets include:

- Offsets promote emissions reductions activities in sectors that do not fall under an emissions cap. Without a market for offsets, there would be limited incentives for those sectors to implement activities that reduce emissions.
- Offsets may reduce the overall cost of compliance, therefore allowing for more aggressive emission reduction goals. Offsets introduce greater flexibility into a cap-and-trade system, and open the market to sectors in which emissions reductions may be cheaper.

Some people are skeptical about allowing offsets into carbon markets for a number of reasons:

- Emissions reductions from offsets may be hard to reliably measure and verify because they often come from decentralized sources.
- International offsets send money overseas, which is often politically unfavorable.
- Unless accompanied by more stringent caps, offsets reduce the amount of emissions reductions a firm must generate on-site.

Emissions reductions generated from avoided deforestation activities in developing countries are one possible type of offset.

What carbon markets are currently in place?
Since the ratification of the Kyoto Protocol in 2004, several carbon markets have developed. Some of the markets are regulatory while others are voluntary. Table 8 below provides a summary of these markets.

1) Regulatory Markets
The Kyoto Protocol set up the **International Emissions Trading (IET)** Scheme, which is a cap-and-trade system that allows Annex I countries to trade allowances with other Annex I countries. The IET is not formally operational, but a European Union trading scheme (described below) is operating as a sort of regional pilot for a future global carbon market.

Two mechanisms were created under the Kyoto Protocol to create flexibility in the market:

- The first mechanism is referred to as **Joint Implementation (JI)**, under which an emissions reduction project located in an Annex I country generates offsets that can be purchased by other Annex I countries and used for compliance in a regulatory cap-and-trade system.
- The second mechanism is the **Clean Development Mechanism (CDM),** which allows Annex I countries to purchase offsets generated by activities implemented in a developing nation that is a party to the Kyoto Protocol. The purchasing Annex I nation may then use those offsets for compliance in a regulatory cap-and-trade system.

The Kyoto mechanisms were created to stimulate sustainable development through technology transfer and investment, help countries with their Kyoto commitments to meet their targets in a cost-effective way, and encourage the private sector and developing countries to contribute to emission reduction efforts.

The **European Union Emissions Trading Scheme (EU ETS)** (2005-2012) is a cap-and-trade scheme to help EU nations meet their Kyoto targets. Under the EU ETS, the governments of EU Member States agree to national emissions caps that must be approved by the European Commission (EC). Governments allocate allowances to their regulated industries and entities operating in the country, track and validate actual emissions in accordance with the relevant assigned amount, and require that allowances be retired after the end of each year.The EU ETS accepts credits from CDM and JI to be traded in the market. The EU ETS is the largest multinational carbon market currently in existence.

Several years ago, the EU voted to exclude carbon offsets from forestry projects from the ETS as these were considered uncertain due to risk of forest fire, disease or other natural disasters. Ongoing negotiations regarding a post-Kyoto climate change treaty indicate, however, that the EU is in fact poised to consider forest-based carbon offsets in the future.

The **New South Wales GHG Abatement Scheme (NSW)** (2003-2012) creates emissions benchmarks for electricity retailers in Australia. This scheme establishes annual statewide greenhouse gas reduction targets, and requires individual electricity retailers and certain other parties who buy or sell electricity in NSW to meet mandatory benchmarks based on their share of the electricity market. If these parties, who are referred as "benchmark participants'" fail to meet their benchmarks, a penalty is assigned. Monitoring the performance of benchmark participants is undertaken by the Independent Pricing and Regulatory Tribunal of NSW (IPART). This system will soon transition into a National Emissions Trading scheme for Australia.

The **Regional Greenhouse Gas Initiative (RGGI)** is an agreement among 10 Northeastern and Mid-Atlantic states in the U.S. to implement a market-based cap-and-trade system by 2009. The agreement will mandate a cap and reduction in carbon dioxide emissions from power plants. RGGI is the first mandatory cap-and-trade program in the U.S. that addresses emissions responsible for climate change, and it is viewed as a potential model and precedent for a broader federal program to limit emissions of greenhouse gases in the U.S.

The **California Climate Action Registry (CCAR)** was established in California in 2001 through legislative action.

CCAR is a non-profit public-private partnership that serves as a voluntary greenhouse gas registry to protect, encourage, and promote early actions to reduce greenhouse gas emissions. The expectation is that early actions reported under CCAR will be eligible for crediting under future California emissions regulations.

2) Voluntary Markets

There currently exist two large voluntary markets - the Chicago Climate Exchange and the Over-the-Counter Market.

The **Chicago Climate Exchange (CCX)** creates a market based on a cap-and-trade system in which participation is voluntary. Once an entity chooses to participate in the CCX, emissions reduction commitments become legally-binding. The CCX allows members who take on commitments to trade allowances with one another, and to purchase offsets from projects developed outside the membership cap.

Heightened public awareness of climate change has greatly increase participation in the **over the counter (OTC)** market for carbon offsets, and this market has progressed and developed alongside regulatory markets. Many sources of GHG emissions, such as travel, household activities and special events, which are not addressed by existing policy instruments, can be mitigated through offset purchases on the OTC markets. While it is not practically feasible to reduce one's emissions to zero, purchasing offsets can help individuals or companies "neutralize" their emissions levels. Participants in the OTC market include companies, governments, organizations, organizers of international events, and individuals, all of who purchase or sell carbon offsets for reasons other than regulatory compliance. These retail offsets or credits, commonly referred to as Verified Emissions Reductions (VERs), are often purchased from retailers. Retailers consist of organizations that invest in a portfolio of offset projects and subsequently sell slices of the resulting emissions reductions "portfolio" to customers in relatively small quantities, and at a higher price than purchased. There are approximately 30 to 40 such retail providers worldwide, most of them based in Europe, the U.S.[36], and Australia36. Prices vary greatly, from US$5-$35 or more per tCO_2e, depending on the quality and location of the project, and the price set by the retailer[37]. The market is wholly unregulated, as the credits are not being used to meet legally binding targets, though project developers may choose to follow CDM standards and verification methods, or may develop their own methods to ensure the integrity of the offsets sold.

The voluntary market represents a promising complement to the compliance market as it covers many project types that are otherwise excluded from regulatory markets. While projects generating less than 50,000 tCO2e annually are typically considered unattractive in the regulatory CDM market, such projects make up approximately 86% of the voluntary market. The voluntary market therefore effectively creates market opportunities for small-scale projects that would otherwise not exist. In addition, forestry projects that are for the most part excluded from compliance markets make up 56% of the voluntary market[38].

---

[36])Taiyab, N. 2006. Exploring the Market for Voluntary Carbon Offsets. International Institute for Environment and Development

[37])Butzengeiger, S. 2005. Voluntary Compensation of GHG Emissions: Selection Criteria for Offset Projects. HWWI

[38])Ibid.

Table 7 : Carbon markets summary

Transaction Volumes and Values, 2006 and 2007

Markets	Volume (MtCO2e)		Value (US$ million)	
	2006	2007	2006	2007
Voluntary OTC Market	14.3	42.1	58.5	258.4
CCX	10.3	22.9	38.3	72.4
Total Voluntary Markets	24.6	65	96.7	330.8
EU ETS	1.1044	2.061	24.436	50.097
Primary CDM	537	551	6.887	6.887
Secondary CDM	25	240	8.384	8.384
Join Implementation	16	41	141	495
New South Wales	20	25	225	224
Total Regulated Markets	1.702	2918	40.072	66.087
Total Global Markets	1727	2983	40.169	66.417

Source : Ecosystem Marketplace, New Cabon Finance, Wold Bank

How do existing carbon markets treat forest carbon?
As specified above, emissions reductions from conservation activities are eligible in some but not all segments of the carbon market. The table below lists eligibility of emissions reductions from a range of forest sector activities.

Table 8 : Eligibility of forest carbon in existing markets

Market	Reforestation	Avoided Deforestation	Forest Management
JI	Yes	No	Yes
CDM	Yes	No	No
EU ETS	No	No	No
NSW	Yes	No	No
RGGI	Yes	No	No
CCAR	Yes	Yes	Yes
CCX	Yes	Yes	Yes
OTC	No Common Standard on eligibility of activities		

Currently, only voluntary markets allow offsets from avoided deforestation projects. The inclusion of this category of projects in compliance markets has been controversial in the past due largely to the challenges associated with the proposed project-based approach: baseline uncertainty, leakage, permanence, and the impact of such offsets on the global carbon market. Many of the challenges associated with measuring and monitoring emissions reductions from avoided deforestation project activities have been overcome, and new approaches to REDD address some of the principal concerns associated with including these types of offsets in compliance markets. Future regulatory markets may in fact allow credits from avoided deforestation.

Various standards exist to regulate the quality of credits that flow into carbon markets. These standards are discussed in section 4.1.

2.5.Social Considerations of REDD

More than 1.6 billion people worldwide depend to some extent on forests for their livelihoods and almost 60 million of them are indigenous peoples who are almost wholly dependent on forests to survive[39]. Deforestation and climate change represent real threats to those communities and their traditional ways of living. Traditional overseas development aid (ODA) has not been sufficient to stem the tide of deforestation worldwide. Whether it is implemented as part of an international agreement or under the current system of projects designed for voluntary offset buyers, REDD results in a flow of funds for forests that have previously had little economic value. Whether this financial flow benefits or harms forest-dependent communities depends the design of the REDD scheme.

Most UNFCCC level proposals for REDD are still on the drawing board and have not defined the key design elements that could impact forest-dependent communities. Therefore, there remains an opportunity to design the mechanism in such a way that will ensure forest-dependent communities benefit. This chapter will describe the potential benefits and risks to forest-dependent communities from a REDD mechanism and explore how certain elements of the mechanism could be designed to maximize benefits and mitigate risks.

The potential benefits of REDD for forest-dependent communities include direct payments based on the maintenance of intact forest, employment, training in natural resource management, and the continued use of the forest for traditional livelihoods and other cultural values. REDD does not preclude the use of the forest for other activities like ecotourism and sustainable forest management. REDD activities operate over a long time scale, and the benefits have the potential to be continuous for decades.

New financial flows to forests also carry significant social risks. If the REDD scheme is controlled by elites, then benefits might not reach local communities. In areas with unclear land tenure, people with traditional claims to land could lose access to this land, and in extreme cases of abuse, lands could be expropriated and local people could be displaced. The complex nature of REDD may lead to abusive contracts with local people who lack access to information about the mechanism. Decreased access to new agricultural lands could result in less agricultural production or higher food costs. The inequitable distribution of funds within local communities could also lead to serious social conflicts.

Some early REDD projects have attempted to minimize these risks by applying best practices like the ones described in the CCB Standards[40]. These standards include basic safeguards for forest-dependent peoples and are designed to allow buyers of offsets to identify projects that generate exception benefits for local communities. Many buyers in the voluntary market now express a preference for CCBA certified projects and have indicated a willingness to pay a premium for credits from these projects. These buyers perceive a benefit in being associated with projects that generate co-benefits, and also believe that these projects are inherently less risky than projects which don't include the participation of local communities.

---

39) FAO Facts and Figures: http://www.fao.org/forestry/28811/en/

40) Climate, Community & Biodiversity Alliance: http://www.climate-standards.org

At the UN level, it is not yet clear how much detail on social issues can be included within an international agreement. Land tenure, revenue distribution, and public participation in land use decisions traditionally fall under the realm of national regulations rather than international agreements. Therefore, how to address the interests indigenous peoples and forest-dependent communities in a REDD mechanism is still under debate. Nevertheless, any REDD mechanism will have implications for those groups and they should therefore be allowed to actively participate in the design of such mechanisms.

Implications of REDD for forest-dependent communities
There are a number of design features of REDD that are relevant to how a mechanism will affect forest-dependent communities. Here we will investigate how the main policy issues mentioned in chapter 2.3 could impact indigenous peoples and other forest-dependent communities and look at some additional factors that have specific relevance for local communities.

- **The scale of the mechanism:** Implementation of a REDD mechanism at the project scale may allow for more involvement of local communities in the design and implementation of the REDD activities. It may also make it easier to measure and monitor social risks and benefits. Providing incentives to national governments, however, will provide an impetus to make the large-scale policy reforms needed to truly change forest governance. Whether this results in positive or negative impacts for indigenous peoples and other forest-dependent communities will depend on the individual governments. The process will be undertaken under great international scrutiny, however, which may lead to a more positive outcome. A hybrid mechanism that allows participation in the implementation of activities at the local level and that incentivizes national governments to make needed reforms in forest governance could be one way to maximize the benefits for and involvement of communities.

- **The scope of the mechanism:** Whether the mechanism includes degradation or not could have implications for the social impact of the mechanism. Including degradation would benefit countries, like Indonesia, where a lot of land use emissions result from degradation. Including degradation could also incentivize more sustainable harvest practices such as reduced impact logging. However, if traditional practices such as selective harvesting or shifting cultivation are included in the definition of degradation, it could result in the suppression of these activities and/or displacement (although communities that traditionally engage in those activities would receive compensation for the cessation of those activities).

- **Financing:** Market-based mechanisms have the potential to generate greater levels of funds than other types of financing mechanisms. Larger volumes of financing flowing towards developing countries will provide more new sources of income and greater potential for sustainable development in recipient countries. Market mechanisms, however, have the potential to prioritize efficiency over equity as investors may seek to exploit economies of scale; these concerns may be lower in a fund-based program. No matter the source of financing, however, effective institutions will need to be in place in order to efficiently and equitably distribute the benefits.

- **Reference Emission Levels (Baselines):** If baselines are based only on historic data, it could create winners and losers across countries as well as within countries. Indigenous reserves, for example, often have very low rates of historic emissions. Under a mechanism that uses purely historic baselines, those reserves would not be able to generate credits and earn revenue. This could be mitigated by using different baseline methodologies for different types of areas, or through the creation of a fund that directs revenue specifically towards areas with historically low emissions, as discussed in the policy chapter.

- **Land tenure and carbon rights:** Many forest-dependent communities do not have clear and secure legal tenure over their land, which will make it difficult for them to decide how that land gets used or to receive benefits from its protection. A REDD mechanism may be a powerful impetus to more clearly define land tenure in tropical countries. This could go in either direction for forest-dependent communities: they may benefit by finally being granted legal rights to their land, or they may suffer if governments decide to take away their traditional lands in order to reap the benefits of carbon finance. Additionally, even when clear tenure has been established, laws regarding who owns carbon reductions may not be clear.

- **Systems for benefit-sharing:** REDD benefit flows may be more stable, regular, and long-term than other sources of income and could enhance the security of the poor. Yet finding ways to distribute REDD finances equitably will likely be challenging. Elite capture of benefits and conflicts arising from the increased value of the land could create problems.

- **Level of continued access to the forest:** Forest-dependent communities utilize the forest for many essential goods and services, such as food, water, firewood, and medicines. A REDD mechanism has the potential to improve the long-term availability of those goods and services by providing adequate and stable financing to protect the forests. If the rules of a REDD mechanism are designed in such a way that communities lose access to the forest, however, the impact could be negative.

There are many outstanding questions regarding the rules and design of a REDD mechanism that will have implications for indigenous peoples and other forest-dependent communities. These questions need to be examined not only for their implications for the climate, but also their implications for indigenous peoples and other forest-dependent communities.

Current policy context

The decision made at COP-13 in Bali in December, 2007 to include REDD in the international climate mitigation strategy sparked some controversy around the implications of REDD programs for indigenous peoples and forest communities. Concerns about the implications of REDD for indigenous peoples and forest-dependent communities continued into COP-14 in Poznan in December 2008.

A number of indigenous peoples organizations and NGOs advocating for them attended COP-14 and strongly voiced these concerns through side events, statements, and demonstrations. Many indigenous groups worry that without a seat at the table and without formal rights to their traditional lands, they may get left out of compensation schemes for environmental services. Those groups strongly advocated that a REDD decision make specific reference to the UN Declaration on the Rights of Indigenous Peoples (UNDRIP). Politically, this is controversial because the United States, Canada, Australia, and New Zealand voted against adoption of the UNDRIP and therefore will not agree to language that references that Declaration. As a result of this controversy, SBSTA called for Parties and observers to the UNFCCC to submit their views on issues relating to indigenous people and local communities and REDD. Over the course of 2009, this issue will need to be resolved so that a REDD mechanism can be created that avoids perverse effects on indigenous peoples and forest-dependent communities and ensures their active engagement in the design and implementation of REDD programs and activities.

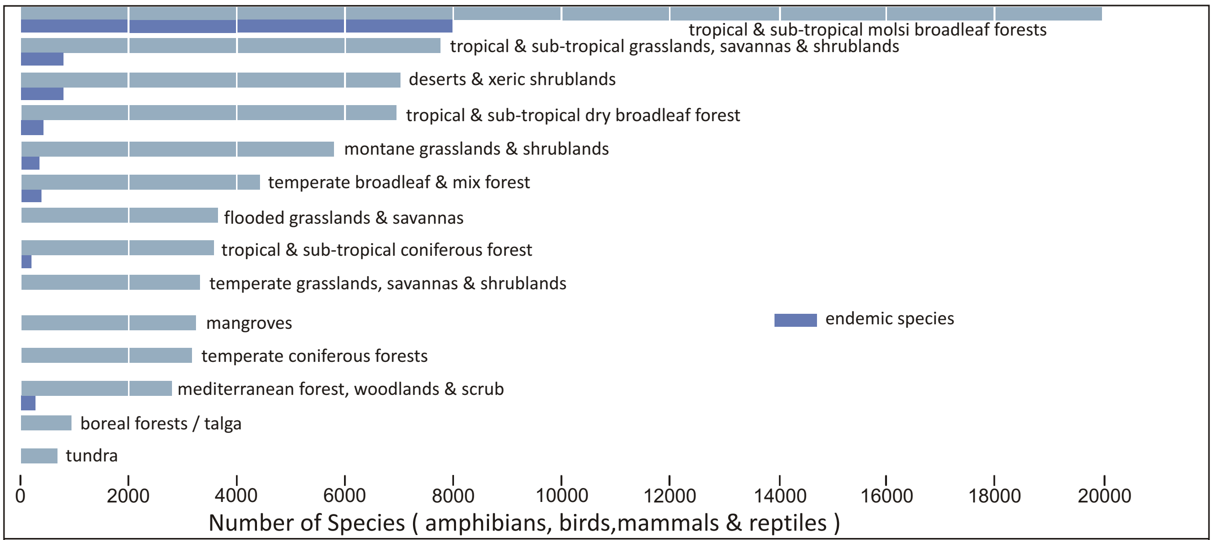
A recent publication *Making REDD work for the Poor*,[41] recently published an in-depth look at the implications of REDD on the poor. This document is a good resource for gaining more insight into how to design a REDD mechanism that maximizes benefits for the poor.

[41]) Peskett, L., D. Huberman, E. Bowen-Jones, G. Edwards, and J. Brown. 2008.
Making REDD Work for the Poor. A Poverty and Environment Partneship Report.

2.6. Biodiversity and Other Ecosystem Services Considerations

REDD is based on maintaining existing tropical forest in order to prevent the carbon that it contains from entering the atmosphere. Maintaining tropical forest has the added benefit of preserving the habitat of the most biologically diverse communities on earth. Tropical forests cover about 7% of the land area on Earth, but harbor an incredible 70% of known terrestrial species. Tropical forests also contain higher proportions of endemic species than any other ecosystem (see Figure 20). This unique array of genes, species, and populations increases the resilience of the forests to withstand environmental change and confers a number of valuable ecosystem services.

Figure 20 : Species Diversity of Terrestrial Ecosystems



Tropical forests containt more species than any other ecosystem, as well a higher proportion of endemic (unique) species. As people clear large areas of tropical forests, entire species are vanishing, many of them unknown

Source: **Millennium ecosystem assessment** *Biodiversity Synthesis*. report can be downloaded from Millennium ecosystem Assessment **Synthesis Report** page

Potential Benefits of REDD for Ecosystem Services

In addition to serving as the home of countless species, forests also are the source of vital ecosystem services.

- Forests help regulate rainfall patterns and regional climate systems,
- Maintain water quality and quantity,
- Reduce risks of erosion,
- Maintain populations of natural crop pollinators,
- Confer cultural and religious values
- Confer landscape values that promote non-extractive activities like tourism, and
- Provide numerous valuable products like food, construction materials, fuelwood, and medicine.

Despite the wide array of benefits that tropical forests provide, they are being destroyed at alarming rates – more than 13 million hectares are deforested each year[42]. This is because most of the services that forests provide are never monetized. Standing forests must be valued more highly than the alternative uses of the land if it is to resist conversion. By generating financial returns for standing forest, REDD offers a means of maintaining all of these benefits, in addition to contributing to climate change mitigation.

Potential Risks of REDD for Ecosystem Services

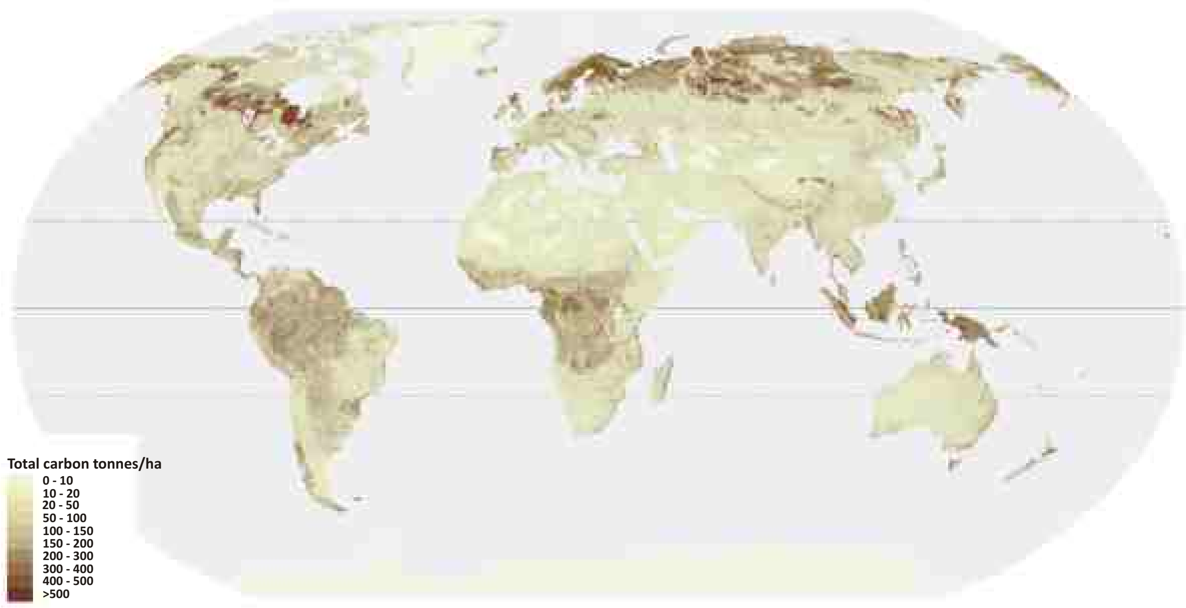
Those benefits are not guaranteed, however. Since the goal of the UNFCCC is to stabilize emissions, decisions made under the Convention, including decisions on REDD, may not make explicit provisions for delivering the other benefits of reduced deforestation. The structure of a REDD mechanism will affect how REDD activities on the ground impact biodiversity and ecosystem services. Here, we will investigate some of the risks to biodiversity of a REDD mechanism and explore some ways to mitigate those risks.

Prioritizing carbon storage in land use decisions

REDD is unlikely to benefit all forests equally. For REDD to make a successful contribution to combating climate change, countries implementing it will have to target threatened forests with a total high volume of carbon in their biomass and soils. Priority areas for tackling deforestation to reduce emissions will not always reflect other forest values (e.g., conservation, livelihoods support, or delivery of fresh water). Some sites may be less valuable from a carbon perspective but of high priority for other reasons.

Scientists are beginning to compare the distributions of carbon and biodiversity around the world to understand how REDD schemes could be developed to maximize benefits for biodiversity. The United Nations Environment Program has recently published a study detailing some of the initial results of this research[43].

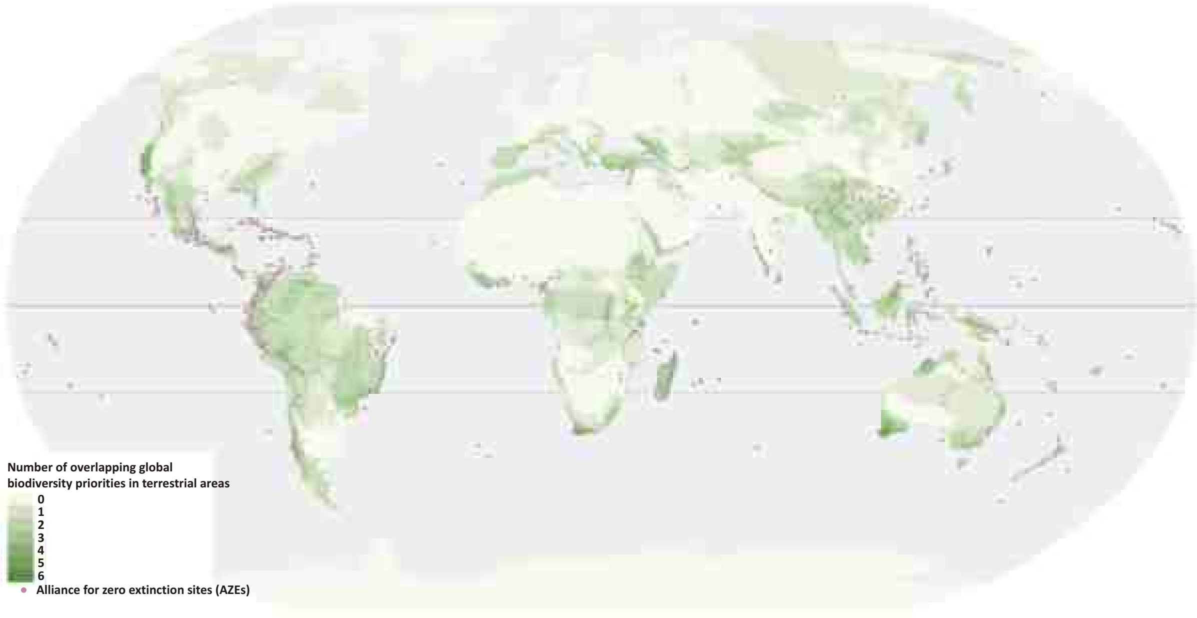
Figure 21 : Carbon and Biodiversity Maps



---

[42]) Food and Agriculture Organization of the U.N.: The State of the World's Forests 2003

[43])United Nations Environment Program World Conservation Monitoring Centre. 2008. Carbon and Biodiversity A Demonstration Atlas.



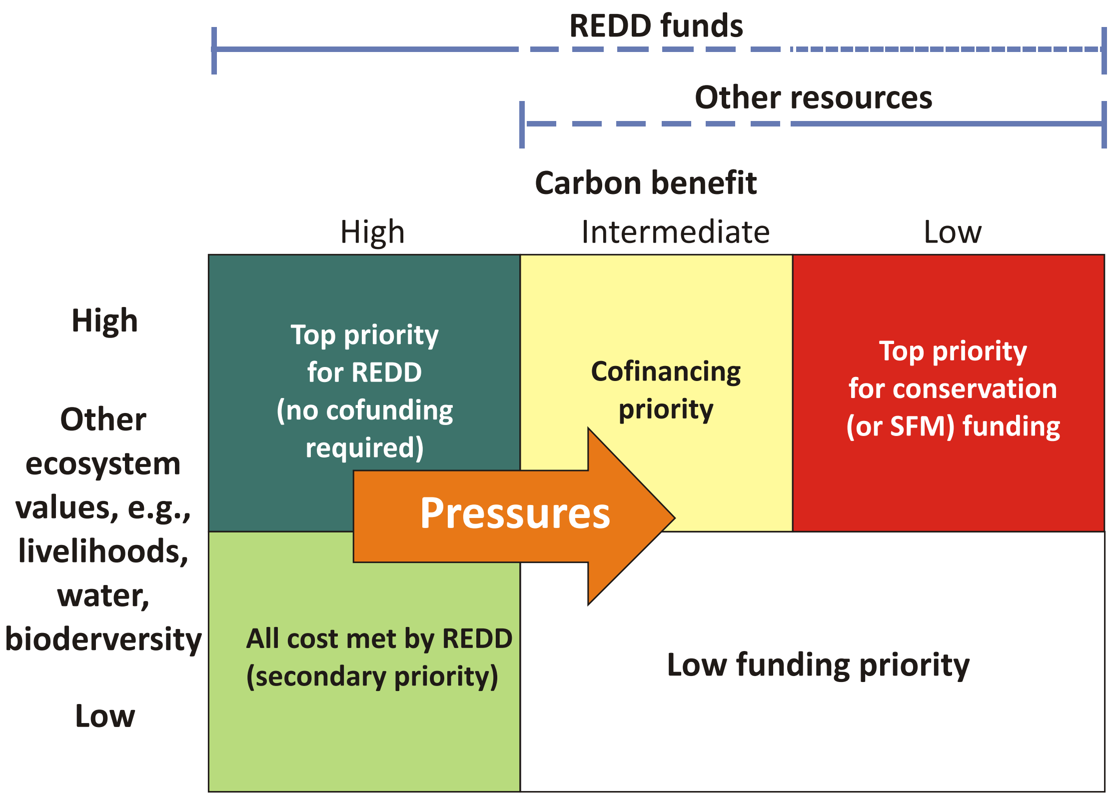
Source : United Nations Environment Program World Conservation Monitoring Centre. 2008. Carbon and Biodiversity A Demonstration Atlas

The two maps shown in Figure 21 are included in that study. The first map shows the amount of carbon stored in terrestrial ecosystems. The darker areas represent areas of high-carbon density. The second map shows biodiversity priority areas. Areas where 4 or more priorities overlap (darker green areas) are considered to be 'high biodiversity' areas. Take a moment to compare the maps and consider the implications of focusing protection efforts primarily on high carbon forests. Also look for areas where high carbon storage overlaps with high biodiversity – these could be areas where benefits for both biodiversity and the climate could be achieved in a big way.

If REDD is prioritized for forests with the highest carbon levels, this could mean that deforestation activities would be diverted to forests with smaller amounts of carbon. This could potentially have unintended consequences for species that live in those low carbon forests. There are several ways to mitigate this risk. One way would be to prioritize non-REDD conservation funding for those areas that are high in biodiversity, but low in carbon storage. The Figure 22 illustrates this.

An understanding of the drivers of deforestation at any REDD site is crucial to be able to predict and mitigate the displacement of deforestation to high biodiversity sites. A well-designed monitoring plan is also necessary to understand the long-term impact of REDD activities on biodiversity.

Figure 22 : Conservation Funding Priorities



Source : Miles, L. and V. Kapos. 2008. *Reducing Greenhouse Gas Emissions from Deforestation and Forest Degradation: Global Land Use Implications.* Science 320

Leakage

Displacement of deforestation activities ("leakage") can occur at any scale, from local to international. At the global scale, leakage to countries with historically low levels of deforestation could have a strong negative biodiversity impact.

As an example, think about this scenario: Indonesia has historically high rates of deforestation and therefore would be eligible to receive REDD incentives to reduce those rates.

Gabon has historically low rates of deforestation and therefore would likely not be eligible to receive REDD incentives. Thus Indonesia begins conserving more and more of its forests rather than converting them to other uses, yet demand for timber and agricultural products remains. Therefore, loggers, cattle ranchers, and biofuels producers could simply shift their operations to Gabon and begin converting their forests. As a result, biodiversity is conserved in Indonesia but lost in Gabon. This scenario could also play out within countries, where forest conservation in one area may lead to deforestation in other forests in the countries or even to conversion of non-forest land to productive uses.

There are ways to mitigate against this risk. One way is to use different baseline methodologies for different circumstances. Countries with historically low rates of deforestation could use a projected baseline which takes into account future pressures on their forests. This would encourage a broader participation in the mechanism and therefore reduce the risk of deforestation or conversion leaking into those areas. Another way to deal with this risk could be to create a 'stabilization fund' to pay for forest conservation in countries like Gabon. This fund could potentially be financed by a 'leakage tax' on REDD credits.

Forest Definitions

The current definition of a forest used for reporting and accounting purposes under the Kyoto Protocol does not recognize the difference between plantation forests and natural forests. The distinction is important because natural forests typically harbor much greater biodiversity (and carbon) than plantation forests do.

The definition of forest is different in different countries, and includes thresholds for the size of the forest patch, the percentage of tree cover, and the height of the trees. Depending on the definition applied land managers could potentially convert primary forests to short-rotation crops for a period of time and then replant the land as a plantation forest, without technically deforesting. This could have dramatic negative consequences for biodiversity and also for carbon. This risk could be reduced by changing the definition of forests to distinguish between 'natural' and plantation forest, and by using monitoring techniques that assess actual carbon stocks and not just forest cover.

Degradation

Related to the discussion on the previous slide, degradation is another important issue. The degradation of forest may result in significant loss of carbon stocks and biodiversity without greatly altering forest cover. This can happen through selective logging or other uses of the forest and the activities that result in a loss of forest biomass typically also result in a loss of wildlife and damage to habitat. Traditional remote sensing techniques are not effective at monitoring degradation but must be improved to avoid potentially large greenhouse gas emissions from degradation and potentially major impacts to biodiversity.

For this reason, among others, it is important that reducing degradation is part of a REDD mechanism.

Conclusion

Forest conservation through REDD is almost certain to carry significant benefits for biodiversity. Nevertheless, it is important that REDD schemes be designed to mitigate the known potential risks and use appropriate monitoring methods to identify and address unintended effects.

SECTION 3:
National Level Considerations

3.1. The Scale of REDD : National- and Project-Level Activities

As discussed in section 2.3: REDD Policy Context, one of the main outstanding policy issues surrounding the creation of a REDD mechanism is whether the mechanism should be a 'national-level' mechanism or a 'project-level' mechanism. There is a lot of confusion built into these discussions due to a lack of clarity about what those terms mean. In this section, we will clarify the terms, discuss the advantages and disadvantages of various options, and look deeper into creating linkages across scales.

Defining the Terms

There are three basic levels at which REDD activities could take place. For the purposes of this manual, we define the terms as such:

National-level REDD program: A national government implements a national accounting system based on a national baseline. Credits are allocated to the national government based on performance against this national baseline. A national monitoring system and credit registry would also be part of the program. National approaches do not necessarily imply that implementation of emissions reductions strategies would need to occur at the national level.

Sub-national-level REDD program: REDD activities are implemented at a sub-national scale but at a governmental level (a state, province, district, etc). Credits are allocated to the sub-national government based on performance against the sub-national baseline.

REDD projects: REDD projects are another form of 'sub-national' implementation. For purposes of this manual, we distinguish REDD projects from other sub-national activities as activities that are implemented by non-governmental entities. Instead, they are implemented by project developers (NGOs, communities, etc). Project developers own emission reductions and credits are allocated to the project developer based on performance against the project baseline.

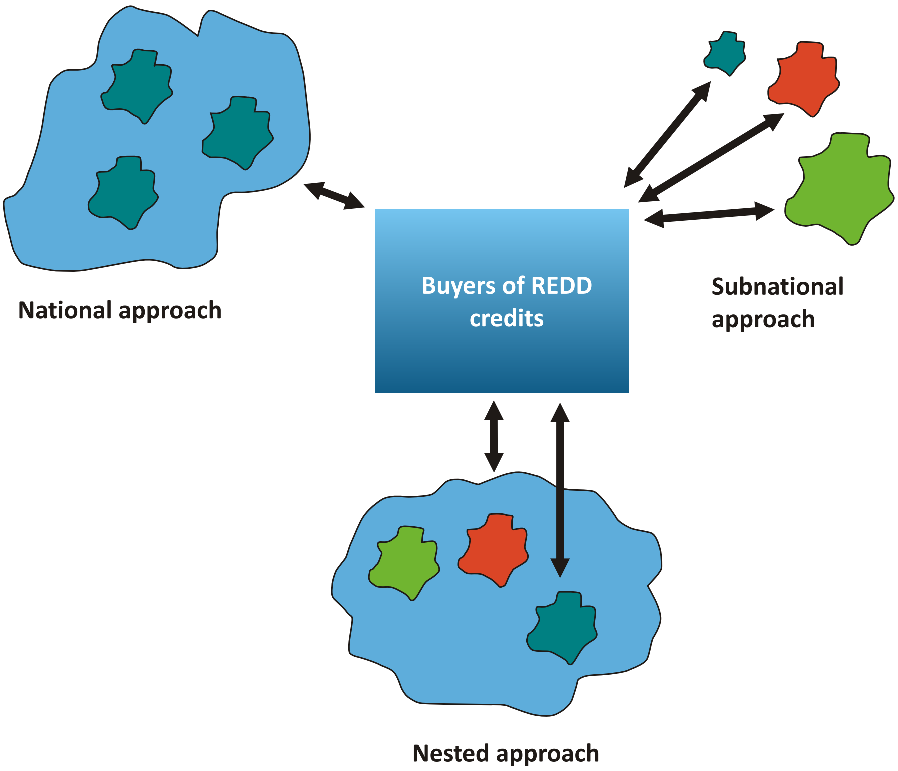
Hybrid ('nested') approaches: Project or sub-national-level REDD activities are undertaken, but are somehow linked to national-level performance.

Figure 23 highlights the main difference between each approach. In a national approach buyers (or funders) of emissions reductions interact only with national governments. In a sub-national approach buyers (or funders) interact directly with the sub-national entity that produces the credits. In a nested approach, the option exists for buyers (or funders) to interact with owners of credits at either the national or sub-national level.

National and Project Scale Activities

In order to discuss the advantages and disadvantages of each option, it is important to be clear about which REDD activities we are discussing. There are various REDD activities that could be undertaken at various levels, and there are pros and cons to doing those activities at either the national or project level.

Figure 23 : Various Possible Scales of REDD



Source : Angelsen, A.,c. Streck, L. Peskett, J. Brown, and C. Luttrell. 2008. What is the right scale for REDD? in: moving ahead with REDD: Issues, Options and Implications. Center for International Forestry Research (CIFOR).

Carbon Accounting

Setting a baseline and accounting for emissions reductions against that baseline could be undertaken at national, sub-national (state, district, province, etc), or project levels. Setting a baseline and accounting for emission reductions at the project level may be less complex and methodologies to do so have been piloted in many climate change mitigation initiatives around the world. A disadvantage of accounting for emission reductions only against a project baseline, however, is the potential for leakage or activity displacement. The REDD activity may cause emissions to increase elsewhere in the country and these emissions may be hard to account for under a purely project-level accounting framework. National-level accounting frameworks address this concern by counting emission reductions against a national baseline – therefore any emissions that occur within the country would be accounted for. However, in terms of leakage mitigation, it should be recognized that sub-national frameworks may cover areas larger than small countries (e.g., in the case of major Brazilian states or Indonesian provinces). In addition, national-level frameworks do not account for potential leakage that may occur outside the country, which makes participation by countries within the region, or more broadly, all the more important.

Implementation

Strategies to reduce emissions could be undertaken by national governments (e.g., through large-scale policy reform and/or the establishment of other programs or incentives), by sub-national governments (through district or provincial spatial planning, policies and/or programs), or by other REDD project participants (through specific actions to reduce deforestation in a designated spatially explicit area). Implementing REDD strategies at the sub-national or project level has the advantage of being able to assess and address the specific drivers of deforestation unique to that area. However, implementing a REDD mechanism in a piecemeal fashion, with only limited involvement of national authorities, may not result in the large-scale policy and institutional adjustments that are needed to truly address systemic deforestation drivers at the necessary scale.

Implementing national-level policy reform would enable more rapid scale-up of REDD activities. However, the drivers of deforestation can vary greatly within a country. Implementing purely national activities may not effectively address all the diverse drivers in the country in a way that flexibly considers the local needs and requirements of stakeholders. Additionally, for many countries it may be challenging to establish the political, legal and institutional structures necessary to effectively implement national approaches to REDD, therefore, in some cases, project participants and sub-national entities may be the most efficient option when implementing REDD activities and measures

Ownership of Emissions Reductions

Under a project-level approach to REDD, project developers would own the rights to sell their emissions reductions to international carbon markets or private funders. This approach is favored by many private investors because they would have more control and oversight over what they are buying and what their money is used for. Under a national-level approach to REDD, the national government would own the emissions reductions generated by any activity in the country. The national government would then have the authority to allocate incentive payments to various actors who have reduced emissions throughout the country. This approach is favored by some because it guarantees that compensation is based on performance against a national baseline. However, many private investors are wary about investing their money in national governments because of concerns about corruption and inefficiency. In order to be successful, a REDD mechanism must be attractive to private investors. Therefore, it may be necessary to develop the mechanism in such a way that investment can flow transparently to both national governments and project developers.

Creating Linkages across Scales

As discussed in the section above, there are many advantages to creating hybrid approaches to REDD that allow for various activities to be undertaken at various scales. Some activities are best performed at the national level.

For example, it is important to set up national-level accounting frameworks to control leakage and national-level monitoring systems to monitor emissions reductions efficiently across the country. In other cases, project level activities may be beneficial. For example, allowing some incentives to flow directly to projects may promote increased private investment in REDD. Finally, in some cases multiple scales are appropriate. A combination of nationally-created policies and measures to reduce deforestation and site-specific actions may, for example, promote needed reform to effectively address deforestation at scale.

The key to making hybrid arrangements work is to link the performance of each project to the performance of the country as a whole and vice-versa. Linkages can be made through taxes, profit-sharing arrangements, or other means. Linking the performance of projects and overall national emissions reductions encourages project developers to reduce in-country leakage and encourages the national government to support the success of all projects.

3.2. National Level REDD Programs

Recent political discussions within the UNFCCC have focused on national-level approaches to REDD. Many Parties favor national approaches because they can better account for in-country leakage and they can achieve the scale and type of reforms needed to address deforestation. The design of such a mechanism is still under intense debate, however, and therefore very few specifics have been nailed down as to what "national-level" REDD approach would entail. However, it is likely that the following elements would be required:

- A credible national baseline for emissions and based on historic emissions levels and/or projected future emission levels;
- A country-wide carbon accounting system;
- A national system for monitoring of emissions reductions; and
- Establishment of a credit registry that allows for the allocation of credits based on national performance.

Aside from the requirements listed above, there is little additional guidance as to what a national-level REDD approach would require, since very little has been decided in the UNFCCC negotiations. One source of guidance is the World Bank's **Forest Carbon Partnership Facility** (FCPF) which was established to help build capacity in many countries to implement national-level REDD frameworks. FCPF guidance is useful for thinking through the requirements for a national level REDD program, but it does not represent the final decision on what a national level REDD program is. This decision can only come from the UNFCCC process. Very few decisions have come out of the UNFCCC thus far, however, and therefore the FCPF provides one of the only sources of guidance currently available.

The **FCPF's Information Memorandum** provides this guidance on the scale of REDD (national or sub-national): "Whether to implement at a national level or through sub-national programs is the sovereign decision of each country and should take into account several factors, including:

- Forest law and regulations, which provides who owns, or has rights to, forest land, timber and non-timber forest products, and other forest services and amenities, including the carbon in the biomass and in the soil;
- Lessons from existing forest policies and programs with respect to the sustainable use of forest resources and biodiversity conservation; whether law enforcement occurs mostly at the national or sub-national level;
- Current drivers of deforestation and degradation, and the current actors of protection against deforestation and degradation;
- Who could start to protect against deforestation and degradation if the legal framework was right and the economic incentives were available
- Formal and customary set of property and user rights;
- Availability of public and private resources for investments in the sustainable use of forest resources and biodiversity conservation;
- The relative costs and effectiveness of various programs to achieve sustainable use of forest resources and biodiversity conservation;
- The need to capture and preserve traditional, including indigenous, knowledge about and practice in forest use and conservation."

The FCPF guidance further states that: "Sub-national activities still need to be accounted for at the national level given the national accounting framework for REDD that would be supported under the FCPF. The legal or regulatory framework governing such a linkage would provide a way to mitigate the risks of leakage and non-permanence from sub-national implementation schemes and define the respective responsibilities of governmental and sub-national actors. In the case of a nested approach, in which the government expects payments for emission reductions reported at national level but the ER [Emissions Reductions] Program(s) consist(s) of local program(s) or project(s), the difficulty will be in attributing the emission reductions claimed by the government to the ER Program(s) in question.” Though the FCPF thus allows for flexibility on the level of implementation of REDD activities and the ownership of emissions reductions, they do provide some guidance on what would be required at the national level. The FCPF considers the following elements to be critical to implementing national-level REDD program.

Reference Scenario : The country would establish a credible reference scenario on REDD, preferably based on methodological guidance from the UNFCCC or other guidance that represents international good practice, taking into account recent historical emissions and, in line with the specific circumstances of each country, a credible assessment of future emissions. In the absence of additional guidance from the UNFCCC, different approaches would be tested based on national priorities and circumstances, building on IPCC 2003 Good Practice Guidance and 1996 and 2006 Guidelines. Readiness would require that such a Reference Scenario has been established;

REDD Strategy : Once the country knows its reference emissions levels it may decide that it wants to reduce its emissions below these levels and specify the broad lines of how much, how, where, and at what cost it intends to do so. Based on an analysis of the causes of deforestation and forest degradation, an efficient, fair and sustainable strategy to reduce emissions, resulting from meaningful consultations with the full range of stakeholders, would be developed, complementing the existing national policy framework. Special efforts would be made to reach out to forest dwellers including indigenous peoples and ensure that they participate in, and where appropriate benefit from, Readiness activities. The strategy would support the country's overall policy and legal framework as it relates to forests, land use, customary rights, etc.
The strategy would be fully country-owned and would refer, for example, to policies that address cross-sectoral issues, community forest management, and/or macroeconomic drivers of deforestation and forest degradation.

It would identify the options for the most cost- effective and socially acceptable measures to reduce emissions and analyze the potential for further improvements of forest law enforcement, land tenure and governance structures relevant to implementing REDD activities. Furthermore, the strategy would need to define the institutional responsibilities, ownership of Emission Reductions, future regulation of the distribution and use of future revenues from REDD, and would attribute rights and responsibilities to the various actors expected to be involved in REDD; and

Monitoring System : A basic system for monitoring and verifying REDD would be designed and implemented. National institutions would be trained and forest data reviewed and adapted to the purposes and standards of REDD. The country would be able to report on emissions from deforestation, evolving toward the use of an IPCC Tier Two approach with the help of capacity building provided by the FCPF and other entities, and potentially evolving toward a Tier Three approach in those countries where conditions and capacity building would enable it. Readiness would require that such a Monitoring System has been implemented.

Readiness

Many countries do not currently have the capacity to create a national level approach to REDD. Some countries have begun to engage in readiness activities so that they will be able to participate in a REDD mechanism once it is established. The FCPF is supporting these activities in some countries. Countries that will participate in the FCPF are required to complete a Readiness Plan Idea Note (R-PIN). These R-PINs offer insight into the activities that each country is undertaking at the national level to prepare for REDD and provide an excellent overview of the data and capacity needed to create a national level REDD program. R-PINs are available for download:
http://wbcarbonfinance.org/Router.cfm?Page=FCPF&FID=34267&ItemID=34267&ft=DocLib&ht=42503&dl=1

Conclusion

Very little information is available about national level REDD programs because there are no countries who have yet implemented such a program. Indonesia is perhaps the closest. The Indonesian government is currently in the process of creating a national regulation on REDD. The regulation is nearly complete, though it has not yet been released. Lessons learned from the Indonesian process can hopefully help guide other countries as they develop similar programs. Meanwhile, many questions still remain unanswered about what a national-level REDD approach will look like.

SECTION 4:
PROJECT LEVEL CONSIDERATIONS

4.1. Standards for REDD Projects

Forest carbon project standards are necessary in order to ensure the creation of credible, high quality emission reduction credits. Project standards serve numerous purposes. Standards create an understandable product that is known to have certain characteristics. The creation of such a known entity ensures credit fungibility – standards ensure that each ton that is credited actually represents one ton of emissions reductions and therefore each ton has an equal value in a market. Standards also reduce risks for both project developers and investors since they allow each actor to know exactly what they are selling and buying. Finally, standards can differentiate projects by quality – the type of standard used and level of certification achieved can demonstrate additional project benefits such as improved local livelihoods or conservation of high-biodiversity areas.

Most standards have several aspects in common. They include an impartial 3rd party evaluation of the project for accreditation, validation and verification. The process is transparent, incorporating a period of public comment to avoid dissent in the latter stages of development. This usually results in the issuance of a certificate for projects that meet the requirements of the standard in question.

Credits from REDD are not currently accepted in the regulatory markets, and existing standards are designed to address key market concerns from voluntary buyers about permanence, leakage, additionality, and social and environmental benefits and risk.

Though numerous standards exist in the broad voluntary carbon market, only two standards are being broadly applied to REDD projects. The Voluntary Carbon Standard (VCS) is emerging as the dominant standard for the quantification of emissions reductions from REDD projects. The VCS version 2007.1 was released in November 2008 with specific rules and guidance for the creation of emissions reductions certificates from REDD. One innovative aspect of the VCS is that projects are evaluated in terms of the risk of non-permanence, and projects are required to deposit a percentage of their credits into a pool of credits that the VCS uses to compensate buyers in the event that a protected forest is lost during the project accounting period.

A second standard which is now in wide use for REDD projects is the Climate, Community & Biodiversity Standards (CCBS). These standards were designed for offset projects that seek to demonstrate additional social and environmental benefits. The CCB process evaluates projects in the planning or early stage of project implementation and a third-party evaluator determines whether the project meets its required objectives. The CCBS is a certification of project quality, but does not issue emissions reductions certificates that can be traded and so many buyers seek projects that combine the VCS with CCBS. The CCBS promotes the use of best practices in project design, and buyers seek to combine the robust carbon quantification required under VCS together with the demonstration of co-benefits under CCBS. The co-benefits may be attractive to buyers as additional value for their investment, and also as a way to reduce risk and enhance the sustainability of the projects.

If REDD is adopted under the UNFCCC or other regulatory frameworks, additional standards will be created to regulate the entry of REDD credits into those frameworks. Lessons learned from the use of standards in the voluntary markets are likely to play an important role in demonstrating that REDD can produce real, measurable, verifiable and permanent emissions reductions for the regulatory market.

4.2. Project Life Cycle

This section of the resource manual will outline the main steps involved in implementing forest carbon projects. The goal of the section is not to make you an expert on forest carbon project implementation, but rather to give you an idea of the main steps involved in the process.

The role of the project developer

Leadership and vision is required to bring all the partners to the table at the start of the process. The project developer will need to convene these partners early and often during the planning process in order to get agreement on the purpose and objective of the project among the key stakeholders. The project developer may need to take an active role in building capacity among the key stakeholders in the early stages of the process since the project may be the first time certain actors are involved in forest carbon projects under legal agreements.

Some of the key functions of the project developer throughout the carbon project process include:

- Serving as the focal point for project planning
- Coordinating work plans, timelines, and budget
- Identifying the products required throughout the process and what expertise is needed to deliver those products.

Other key people involved in the project development process include: legal consultants, local NGO representatives, community representatives, government agencies, auditors, verifiers, financial consultants, GIS analysts, and field inventory staff.

Key phases in project development

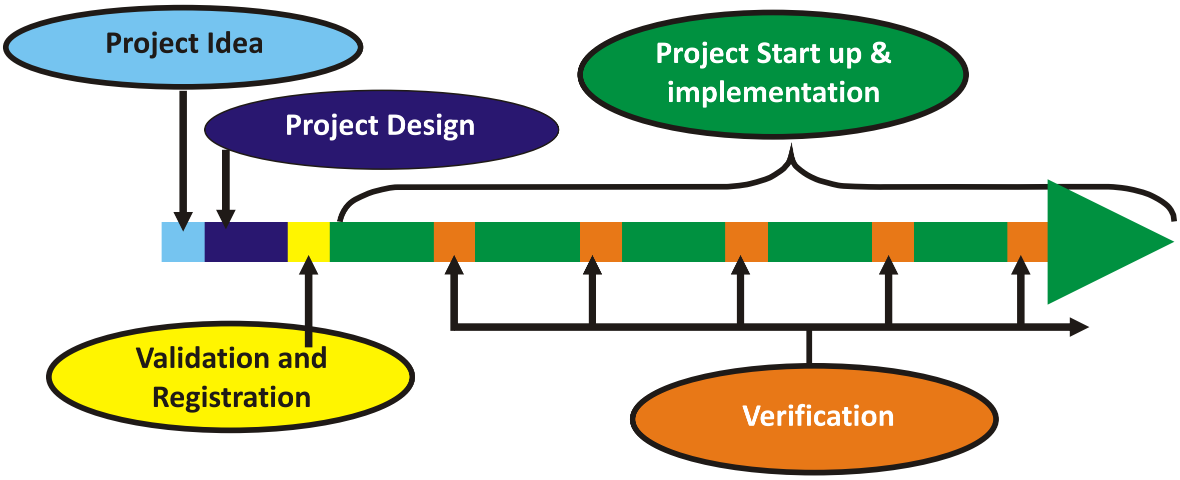
There are five key phases in the development of forest carbon projects:

1. Project Idea
2. Project Design
3. Validation and Registration
4. Implementation
5. Verification

Additionally, fundraising and marketing activities are key components that will take place throughout the process.

It is important to note that project phases do not always have concrete start and end points. Nevertheless, various inputs of time, funding, and expertise will be required at specific points of time, and certain deliverables may be required before other steps in the process can begin. Figure 24 illustrates the key phases and the order in which the phases are undertaken. The subsequent sections will discuss the main activities and outcomes in each phase.

Figure 24: Timing of key project phases



Phase 1: Project Idea

There are several key steps involved in developing the project idea:

- Compile background information: biogeophysical information, socioeconomic analyses, drivers of deforestation, etc
- Identify goals and objectives: What are the biodiversity priorities, desired social benefits, and target emissions reductions?
- Define the project scope and concept: Will the project include only avoided deforestation or also include avoided degradation and/or reforestation or other forestry activities?
- Identify potential partners and define roles: landowners, communities, partner NGOs, government agencies, etc
- Perform initial consultations with key stakeholders
- Examine the legal feasibility: Is there secure land tenure in the project area? Who owns the carbon rights? Is the project allowed under national law? How receptive is the country/state to creating new/enforcing existing regulations in support of the REDD initiative?
- Determine preliminary feasibility

The final outcome of the project idea phase is the creation of a project concept note. The project idea phase takes time and it is important to devote sufficient resources to elaborating the project concept. This process could take between 6 months to 2 years to accomplish. Fundraising is important even during this early stage of the project. Costs associated with travel, consultant fees, capacity building, meetings, and logistics can be significant during this stage. Additionally, it is very important to initiate and foster government involvement in the project during this stage to ensure their buy-in and support. Compiling background information early to develop a credible concept note is critical to generating this donor and government support for the project.

Phase 2: Project Design

The project design phase may be the most intense phase for project developers. The key activities and outcomes involved in the project design phase include:

- Define activities and interventions: What activities are needed to effectively address the drivers of deforestation in the project area and protect the forest?
  Who would need to be involved in executing those strategies? What financial incentives are needed to make the strategies work?
- Determine expected emissions reductions: How will the project quantify/monitor emissions reductions? What data is available and how often should data be
- collected/evaluated? How will the project quantify/monitor the impact of project activities?
- Consult with local communities and stakeholders: What are the expected social and environmental benefits of the project? How will the project respond to stakeholder concerns? How can stakeholders be engaged in the project and what will their roles be?
- Analyze financial costs and legal issues: What are the up-front costs and what are the expected financial flows over the life of the project? What agreements must be signed?

Various experts will be needed during this phase of project development. The project developer will likely need consultants with expertise in: GIS analysis and remote sensing, field biomass measurement, financial planning, community engagement, and legal structures.

The final product of the project design phase is the Project Design Document (PDD). The Project Design Document requires descriptions of: the project concept and duration, the baseline methodology and emissions reduction calculation, the monitoring plan, the social and environmental impacts, and a summary of the process and inputs of stakeholder consultations. The contents and format of the PDD will depend on the requirements of the standards that the project intends to apply. As an example, you can download the PDD template for the Voluntary Carbon Standard here: **http://www.v-c-s.org/docs/VCS%20PD.doc.**

Phase 3 : Project Validation and Registration

After the Project Design Document has been completed, a third-party auditor will need to evaluate and validate your project design. The auditor will determine whether:

- The project has used an appropriate methodology and applied it correctly
- The appropriate steps have been followed according to standard requirements
- The expected emissions reductions have been correctly calculated.

If the auditor determines that the project has met all the requirements of a particular standard (CDM, VCS, CCB, etc), the auditor will approve the project under that standard. The project will then be registered and certified as in compliance with that standard. The validation process can take 2 months or more to complete and may cost anywhere from $7,000-40,000.

Phase 4 : Project Implementation

The project implementation phase includes the following activities:

- Sign and implement all landowner and partner agreements: Lease land, negotiate site protection or maintenance contracts, enact government agreements, sign carbon marketing and sales contracts, and establish the benefits sharing structure
- Undertake needed community engagement and education programs
- Implement project activities: forest protection measures, patrolling, monitoring, fire prevention, alternative livelihood and community benefit activities, etc
- Monitor project impacts: monitor deforestation rates in project site, monitor and mitigate leakage, monitor social and ecological impacts

Project implementation can begin slightly before the auditor has verified the project and lasts for the duration of the project (usually at least 30 years). It is important to note that forest carbon projects require more active management throughout the life of the project than traditional forest conservation projects and this must be accounted for in the project plan. One key factor in the success of many projects is that benefits reach the communities early on. If communities do not see immediate benefit from the project, interest will fade quickly and support may begin to erode.
Therefore alternative livelihood activities must begin at the same time, or prior to, forest protection activities and capacity building activities should be ongoing during the initial phases of the project.

Phase 5 : Verification
Verification of the project occurs after the project has been implemented and will continue throughout the life of the project. During the verification process, a third-party auditor will determine whether:

- The project has been implemented according to the project design and methodology;
- Monitoring has occurred as planned; and
- he expected social and environmental benefits have been realized and negative impacts have been mitigated.

Once the auditor has validated the project according to the selected standard, the project is awarded emissions reductions credits that it can sell.

Forest carbon projects are unique in the level and variety of expertise needed to design and implement the project. For this reason, project design and start-up can be a lengthy, complex, and expensive process. It is important to identify project goals and methodologies early on so that major changes are not needed once the project has already incurred significant costs. A variety of expertise will be needed during all phases of the project, including technical, financial, legal, and management. Though projects can be complex and time-consuming, carbon financing represents a promising new funding tool for forest conservation that could lead to stable and effective long-term projects.

4.3.Project Case Studies

This section contains various case studies of REDD projects throughout the world.

NOEL KEMPFF MERCADO CLIMATE ACTION PROJECT

INTRODUCTION

The Noel Kempff Mercado Climate Action Project (NK-CAP) is preserving the rich, biologically diverse ecosystems of northeastern Bolivia's Noel Kempff Mercado National Park while preventing the release of millions of tons of carbon dioxide over 30 years. In late 1996, when the ecological integrity of almost 832,000 hectares of tropical forest adjacent to the park was threatened by both timber harvesting and unplanned deforestation, The Nature Conservancy and Bolivian conservation organization Fundación Amigos de la Naturaleza worked with the Government of Bolivia to terminate logging rights in the area. This land, along with three small existing conservation areas, was incorporated into the original national park.

NK- CAP was one of the world's first large-scale REDD (Reducing Emissions from Deforestation and Degradation) projects, and is addressing the drivers of both D's in REDD: deforestation from conversion to agriculture by local communities and degradation from logging activities in timber concessions. In 2005, NK-CAP was the first REDD project to be verified by a third party using rigorous standards based upon those developed for the Kyoto Protocol's Clean Development Mechanism. Investments from three energy companies helped to fund project activities, in exchange for rights to a share of the verified carbon benefits generated by NK- CAP.

The success of NK- CAP, demonstrated by the 3rd party verification of carbon benefits generated by the project through 2005, serves as an example of how well- designed REDD projects can result in real, scientifically measurable, and verifiable emissions reductions.

SUMMARY OF BENEFITS

- Verified to have avoided 1,034,107 metric tons of CO2 emissions, which would have been caused by logging and deforestation between 1997 and 2005;
- Estimated to avoid a total of 5,838,813 metric tons of CO_2 emissions over the 30 year project lifespan;
- Preserves a rich and biologically diverse forest ecosystem, chosen as a UNESCO World Heritage Site for its outstanding biodiversity value;
- Facilitated indigenous communities achieving legal status as "Communities of Native Peoples" and in obtaining official land title;
- Provides alternative, environmentally sustainable economic opportunities for the local population via community forestry, ecotourism and biotrade;
- Raised $8.25 million in carbon financing, with additional financing possible upon sale of the Government of Bolivia's 49% share of the project's carbon offsets;
- Established an endowment which is used to fund project activities and preserve the park for future generations.

PROJECT TYPE

Reducing Emissions from Deforestation and Degradation (REDD)

PARTNERS AND CONTRIBUTORS

The Noel Kempff Mercado Climate Action Project is a joint effort, to which the following partners contributed:

4.4. Project Development

The Nature Conservancy (TNC), Fundación Amigos de la Naturaleza (FAN)

4.5. Project Management

Fundación Amigos de la Naturaleza (FAN)

4.6. Project Investors

Government of Bolivia (GOB), American Electric Power Company (AEP), BP America, and PacifiCorp

4.7. Carbon Measurement

Winrock International Institute for Agricultural Development and Fundación Amigos de la Naturaleza (FAN).[44]

4.8. Validation and Verification

Société Générale de Surveillance (SGS)

PROJECT OVERVIEW

4.9. Site Description

The Noel Kempff Mercado Climate Action Project (NK- CAP) was carried out in the northeastern section of the Department of Santa Cruz, Bolivia, in the Province of Velasco (see Figure 25).

Figure 25: NKMNP (on the right in gold) is located in the Department of Santa Cruz, Bolivia in the Province of Velasco. Source: FAN

[44]) Winrock International was responsible for initial design of the measurement program; however, FAN has since taken on the responsibility of carrying out the actual measurements.

At the time of project scoping, a 750,633 hectare protected area called Noel Kempff Mercado National Park (NKMNP) was already in existence. Characterized by outstanding topographical features, the park was principally defined by the Huanchaca (or Caparú) Plateau. The immediate area of the park consisted of natural vegetation and was devoid of sizeable permanent human populations. Located in a climatic transition zone between the Amazonian, Chaco and Cerrado eco-regions, the park was considered one of the most biologically diverse areas of the world.

4.10. Approach

Project activities consolidated threatened areas just adjacent to the park with the park itself, creating one expanded protected area. On December 23 of 1996 the Noel Kempff Mercado National Park was extended to the Paraguá River (west), the Tarvo River (southwest), and the Itenez River (north) via presidential Supreme Decree #24457 (negotiated with the Government of Bolivia by TNC and FAN). In total, the park was expanded by 831,689 hectares, more than doubling the previous size to its current 1,582,322 hectares. The expansion incorporated ecosystems not represented in the original park perimeter and improved the park's protection by establishing natural boundaries. Between 1996 and 1997, FAN bought and retired a total of three concessions from companies that had rights to log the expansion area; the 187,554 hectare Moira concession, 152,345 hectare El Chore concession, and 239,017 hectare El Paso concession (see Figure 26). Additionally, the Paragua II concession was closed, as no legal concession title existed.

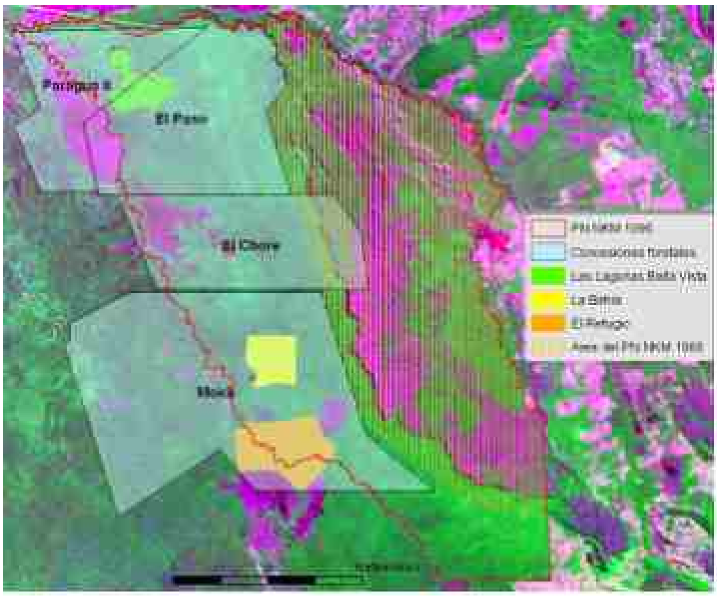


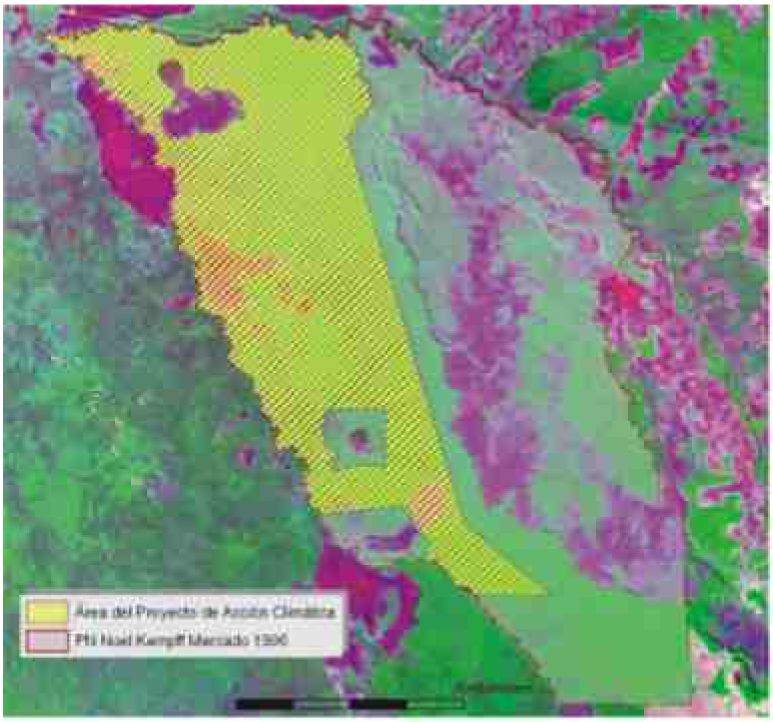
Figure 26: Park boundaries were expanded in December 1996- current NKMNP boundaries are demarcated in red. Timber concessions, depicted in light blue, were retired in January 1997 and incorporated into the expanded NKMNP. Note, portions of the retired concessions fall outside of the project boundaries- more discussion on this aspect in the "Leakage" section.

Source: FAN

The expansion area covered the former concessions, two small protected areas, an existing private protected area to the south (called "El Refugio") and additional buffer zones. Inside the expansion zone, the area eligible for REDD (Reducing Emissions from Deforestation and Degradation) activities was 642,184 ha of forest that had been degraded by former logging activities, was slated for future logging or predicted to be deforested.[45] It is this area that constitutes the carbon benefit generating portion of the project and is what is referred to as NK-CAP (see Figure 27).

[45]) Please note that the three small pre- existing protected areas within the expansion area are not included in NK- CAP (areas eligible for REDD), as they would not qualify as additional.

Figure 27: NKMNP current boundaries (outlined in red) and NK- CAP project section (yellow hashed).



Source: FAN

4.11. On-going Protection and Monitoring

Protecting and monitoring the integrity of the park against fire and illegal activities (logging, land clearing, hunting, fishing with nets) is an on-going activity. Project funds were used to hire 27 park rangers , new rangers' camps have been built, and equipment (motorcycles, boats, field and radios, etc.) has been provided, as have the necessary provisions (fuel, food) to execute the monitoring scheme. In 2008, as part of the monitoring plan, 664 river patrols, 9 airborne patrols, and 4 field monitoring trips were executed.

Remote sensing technology has been used to compliment field monitoring. To this end, Landsat satellite imagery taken between 1997 and 2005 shows that deforestation within NK- CAP is being effectively limited. A 237 hectare area has been lost on the right side of the Paragua River due to flooding and 17.5 hectares of land have been deforested near the community of Bella Vista (presumably by the community itself). This information was factored into the estimation of project carbon benefits (see “Carbon Benefits” section for more information on how they are determined).

Fires within NK- CAP are also being monitored using MODIS satellite imagery (Rapid Response System Fire Response products). A total of 115 fires were detected between 2001 and 2004, occurring mostly in savannah areas. Subsequently, estimates of biomass carbon stocks were discounted by 5% to cover potential carbon losses from fire.

PROJECT STRUCTURE

Various funding mechanisms exist for REDD projects, ranging from investment by project developers, grants, and philanthropic contributions to revenue generated from the sale of verified emission reduction credits. REDD and other forest carbon projects face the same obstacle of surmounting upfront costs. In the case of NK-CAP, carbon revenue was provided upfront by the three energy companies in a contracted agreement through which they were guaranteed 51percent of future certified offsets created over the 30-year project lifetime.[46]

Initial project investment for NK- CAP reached $10,850,000 over the years 1997- 2006 (see Figure 28) for breakdown of contributions and for breakdown of expenditures).

Figure 28 : Breakdown of investor contributions from 1997- 2006, for a total of $10.85 million.

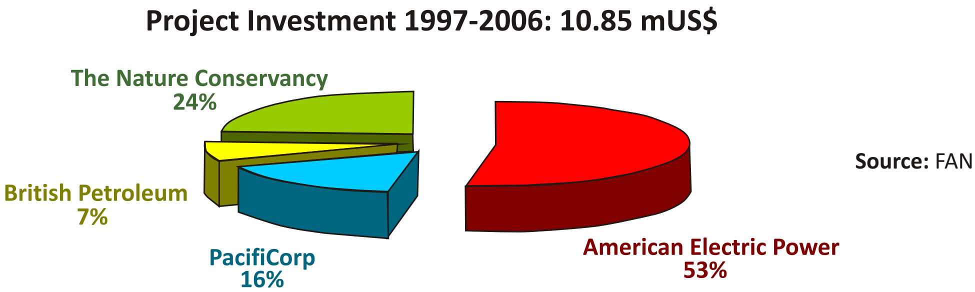
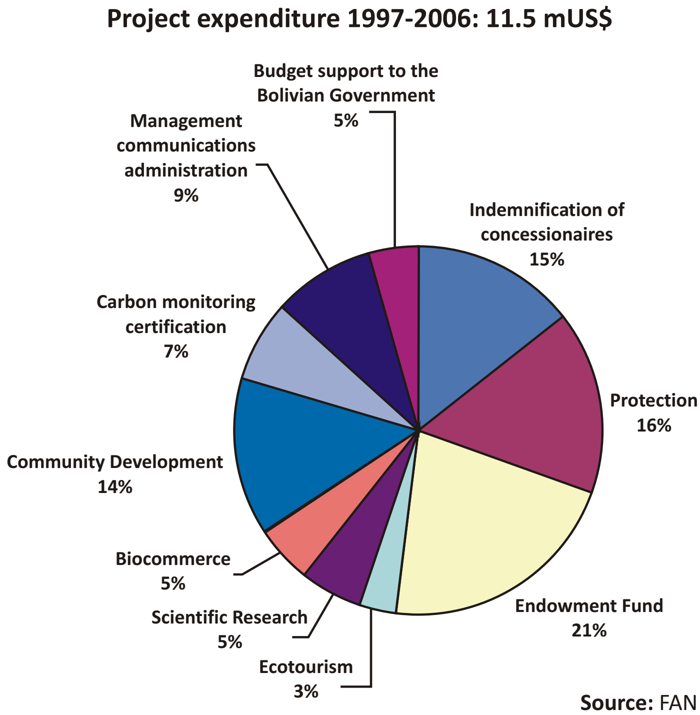


Figure 29 :
Project spending 1997- 2006: $11.55 million. The largest portions of funding went towards community development, timber concession buyout, park protection and the endowment fund. Please note, expenditure is greater than initial funding due to returns on the initial investment.



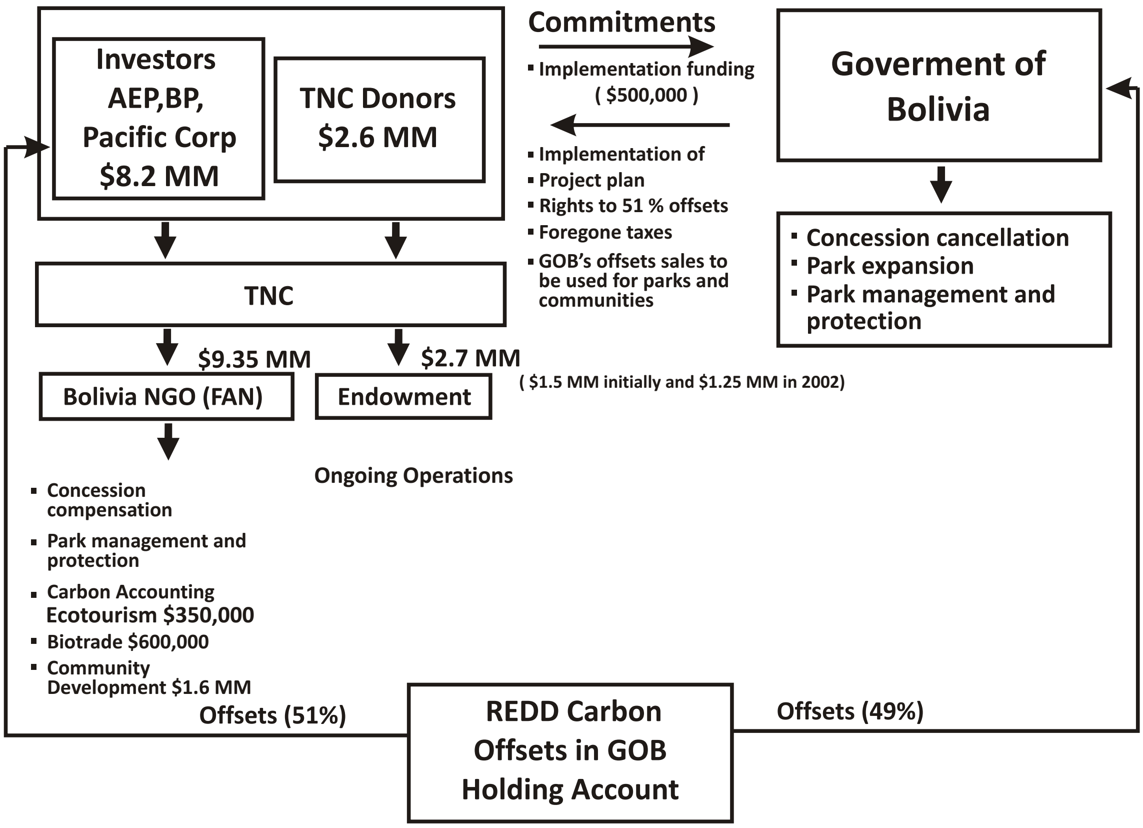
Agreement document. Generally, verification refers the official decision by an accredited 3rd party that a project both conforms to the chosen standard and carbon benefits claimed by the project are real. Certification generally occurs just after verification and is official acknowledgement of carbon credits generated from a project by the body that oversees the standard that the project conforms to.

[46])Note that the word "certified" is used here instead of "verified", as this is the language use in the Comprehensive Agreement document. Generally, verification refers the official decision by an accredited 3rd party that a project both conforms to the chosen standard and carbon benefits claimed by the project are real. Certification generally occurs just after verification and is official acknowledgement of carbon credits generated from a project by the body that oversees the standard that the project conforms to.

4.12. Deal Structure

Initial funding for NK- CAP was provided by The Nature Conservancy (TNC), American Electric Power (AEP), Pacificorp, and BP America. Investments, distributed by TNC to project partner FAN, financed various aspects of project implementation, including: the purchase and retiring of logging concessions, community development, carbon accounting, park management and protection (see Figure 30).

Figure 30 : Deal structure for NK- CAP partners. Source: G. Fishbein



The Government of Bolivia pledged support for the project plan, closed the timber concessions, expanded the park, and agreed to use their 49 percent share of carbon benefits to fund community development, park management and protection. An endowment fund, established and managed by TNC for ongoing project operations, is detailed in the following section.

4..13. Endowment Fund

An endowment fund was created to finance long-term monitoring and protection of the park. The fund was initially begun with $1.5 million. As of 2006, it had reached nearly $3 million through philanthropic contributions and returns on investments. It has been managed by The Nature Conservancy since 1999 and finances park activities in accordance with a long-term financial plan, which is approved by the NK-CAP Board of Directors. FAN serves as the executor of activities financed by the fund and submits yearly reports on the activities supported by endowment income.

4.14. Carbon Rights

As per the NK- CAP Comprehensive Agreement, 51 percent of the certified emission reductions were assigned to corporate investors (AEP, BP and PacifiCorp) and 49 percent to the Bolivian government. Of this 49 percent, the government agreed to earmark 15 percent for the protection of the park, 5 percent for the national system of protected areas and 29 percent for other purposes, including biodiversity protection activities both inside and outside the project area, improving the livelihoods of the indigenous communities adjacent to the park, and supporting other greenhouse gas mitigation strategies throughout Bolivia. There are no specific allotments within this 29 percent and communities in the vicinity of Noel Kempff National Park are currently negotiating with the Bolivian Government to define their share.

The Bolivian government has expressed interest in selling part of their voluntary emission reductions (VERs) on the voluntary market. The sale of these VERs will help finance conservation and community development activities, per the comprehensive agreement.

BIODIVERSITY BENEFITS

Although the focus of REDD is carbon, forest carbon projects have the dual potential to both mitigate climate change and conserve important, biodiverse areas- if designed with this element in mind. As high biodiversity increases ecosystem resiliency in the face of climate change, the two strategies complement and enhance each other.

The Noel Kempff Mercado National Park is located in one of few areas in South America where several different ecosystems converge; the evergreen forest of the high lands, the cerrado's savannas, the savanna's wetlands and the forest's wetlands, making the park one of the richest areas for its heterogeneity of habitats and prompting its inclusion on UNESCO's list of World Heritage Sites[47]. The biodiversity of the area is one of the highest in the neotropics, with 4,000 species of vascular plants, 139 species of mammals, 621 species of birds, 75 species of reptiles, 62 species of amphibians, 250 species of fish and 347 species of insects. Rare and endangered species include tiger, puma, Brazilian tapir, jaguar and caiman- among many others[48].

The Noel Kempff Mercado Climate Action Project was designed to have beneficial impacts on biodiversity and habitats in both the expansion area and original park. Local information suggests that there are many species present in the expansion area which were not present in the original park area, including 64 species of birds, the maned wolf and marsh deer. This is likely due to major differences in habitat and vegetation between the two areas.

Despite these differences, there is general acknowledgment of an ecological interdependence between the original park and expansion area. Migration of fauna between the two areas is responsible for significant dispersion of flora. For example, it has been documented that parrots and macaws migrate between the areas on a daily basis, nesting in one and feeding in the other, and subsequently spreading seeds between both.

---

47) IUCN. 2000. World Heritage Nomination – IUCN Technical Evaluation Noel Kempff Mercado National Park (Bolivia). See UNESCO website: **http://whc.unesco.org/en/list/967.**

48) Project Design Document Form for Afforestation and Reforestation Project Activities (CDM-AR-PDD): Noel Kempff Climate Action Project. May 2006.

Aquatic and marsh fauna are found in both areas and these populations are expected to increase significantly due to the added protection of marshlands and lagoons in the expansion area. Furthermore, several large species migrate annually between the areas, following the seasonal flow of water.

4.15. Monitoring Biodiversity

Key species populations (aquatic turtles, endemic wolves, amongst others) are monitored in the park through a Site Conservation Plan (SCP), which identifies key conservation sites and targets. The Integral Plan of Protection (Spanish acronym PIP) follows the guidance of the SCP and monitoring is carried out by park guards as well as external entities, with the authorization of the National Service of Protected Areas (Spanish acronym SERNAP).

COMMUNITY BENEFITS

Well designed REDD projects can have associated community benefits, as sustainable development activities targeting local communities play an important role in lessening pressure on forest conversion. Many times it is these same local communities which are responsible for the unplanned deforestation project activities aim to prevent. Community development and involvement is often crucial to addressing root causes of deforestation and obtaining long-term buy-in and support for the project.

Over the course of NK- CAP's evolution, the importance of deeply involving communities in project design, ensuring adequate compensation for roles in projects, and respecting and bolstering indigenous rights became obvious. These elements are crucial for any REDD effort to succeed. In practice, this can be difficult if there is an initial lack of community structure, as was the case with Noel Kempff.

Communities were not well organized at the start of the Noel Kempff project; but became increasingly organized as the project proceeded (with support from the project developers). Thus, once organized, they were able to take a more active role in the project planning. Communities have been involved in the community development activities since 2001. They also fully participate in the management committee of the Park, where all operational aspects of the project are discussed.

The use of standards which support community involvement in climate change projects, such as the Climate Community and Biodiversity (CCB) standard, in the design of future projects can help safeguard adequate consideration of community concerns.

To enhance livelihoods in the 7 communities adjacent to the Noel Kempff Mercado National Park (Florida, Porvenir, Piso Firme, Cachuela, Bella Vista, and Esperancita de la Frontera) and to strengthen their organization, two sequential programs were initiated with project funds. The Program for the Sustainable Development of Local Communities (Spanish acronym APOCOM: 1997-2001) improved access to basic services such as health, education, and communication. The Community Development Program (Spanish acronym PRODECOM: 2002 – 2006) emphasized community development by securing land titling, assisting self-organization, and supporting income generating activities such as community forestry and micro enterprise. As part of the project design, a Community Development Action Plan was carried out from 2006-2008 with the goal of raising the standard of living for those communities affected by the project to levels at or above those at which they resided prior to project implementation.

The following community development activities have been supported by the project (amongst others), resulting in overall community benefit:[49]

4.16. Organizational Empowerment

Prior to project implementation, communities surrounding the park had little to no organizational structure. Through APOCOM, the procedure for obtaining legal status for each community was carried out. Project developers assisted communities in accessing the correct government officials and preparing the paperwork to group themselves into the official Central Indígena Bajo Paraguá (CIBAPA). Today, CIBAPA is registered as an organization with legal standing and represents the indigenous communities around the park. As a group with legal standing, CIBAPA was also eligible to file for land tenure with the National Agrarian Reform Institute (INRA).

4.17. Land Tenure and Community Property Rights

Prior to project initiation, none of the communities bordering the park had property rights to the land on which they had historically resided. In 1998, FAN facilitated CIPABA's claim to 360,565 hectares of indigenous territory and this claim was accepted by the Instituto Nacional de Reforma Agraria (INRA- see Figure 31). In June 2006, the official title for the indigenous territory was granted to CIBAPA (called "TCO"- Spanish acronym for indigenous territory.

Figure 31 : Indigenous Territory (or TCO), outlined in yellow, is located just adjacent to the expanded NKMNP.

Source: FAN

4.18. Landuse Planning and Capacity training

To enhance livelihoods and to mitigate leakage, the project financed the creation of a land use plan for the newly titled indigenous territory (TCO). Through the efforts of a consultancy team, FAN, CIBAPA and NKMNP, the Bajo Paragua Native Communal Land Natural Resources Management Plan was developed and four communities were trained in sustainable community forestry.

Agricultural promoters were educated and 5 university scholarships in strategic areas (business administration, tourism, agricultural and forest engineering) were financed, along with 7 awards for polytechnic level study.

4.19. Elementary and High School Education

Schools in the communities of Florida, Piso Firme, and Bella Vista were refurbished and through an agreement with the project, the Municipality of San Ignacio paid the salaries of two teachers. Significant quantities of educational supplies were also purchased. Scholarships were given to 120 primary and secondary school students to continue their studies in courses which were not available in the communities.

[49]) As per the 2005 socioeconomic impact assessment: Calderon Angeleri, Natalia. Livelihood Impact Assessment: NK- CAP, Bolivia, November 2005. Annex 6 of PDD.

4.20. Health Outpost

In the community of Florida, a pre- existing health clinic, which was in very poor condition, was refurbished and expanded to include living quarters for a resident nurse. Another outpost, in Piso Firme, was expanded and converted into a micro- hospital, with a delivery room, laboratory, and dental services. An ambulance is running as part of an agreement with the Municipality of San Ignacio and money was invested to purchase medicine which is administered by community members.

Also, a doctor was hired to live in Piso Firme and make periodic visits to all of the communities.[50]

4.21. Income Generation

Sustainable Forestry

Amongst other income generating activities, the project supported the establishment of a sustainable community forest concession, guided by a sustainable management plan, within the TCO. Today, CIBAPA is running its own sawmill and is the first indigenous community with a timber selling point in the capital of the Department of Santa Cruz[51].

Ecotourism

A visitor center was constructed with the aim of fostering income generation through tourism activities. Cabins were built and repaired in several communities, boats and equipment purchased, and a pontoon bridge constructed for vehicle transportation. Two communities participated in tourism activities by offering guidance, lodging, and other services. Unfortunately, it became quickly apparent that due to the remote location of NK- CAP, travel to the site by tourists would be both difficult and expensive. Thus, the realized benefits via ecotourism have been fewer than originally anticipated.

Botanical Research and Development

A program aimed at expanding the scientific capacities of FAN, while identifying marketable wild plants and products, was started. The GermoFAN laboratory was established with the goal of producing in vitro native plants, such as orchids, that would generate income through their sale. GermoFAN has commercially produced ornamental, medicinal and edible species.

In addition, the largest scientific collection of live-plant ornamental Bolivian species was established through NK-CAP. Today, it includes 2,500 species, 52 of which were identified as new to science, and 18 of which were sponsored for further research.

Further enterprises in Biotrade have been carried out, but did not prove viable, as returns on the initial investments were too small and a strong market didn't exist. This included the creation of “Canopy Botanicals”, a company whose aim was to develop products in three market sectors: organic foods, botanicals and ornamentals. The company promoted sustainable development as well as the equitable distribution of economic benefits to supplier communities but ultimately failed due to low returns.

---

[50]) Calderón Angeleri, Natalia. Livelihood Impact Assessment: NK- CAP, Bolivia, November 2005. Annex 6 of PDD

[51]) Carbon emissions from timber extraction and agriculture within the TCO was NOT subtracted from the carbon benefits of the project. Since it lies within a former timber concession, extraction would have been the BAU state. Furthermore, since this land is now being managed with sustainable forestry practices, emissions from the tract would actually be less than

CARBON BENEFITS

Carbon benefits resulting from REDD project activities are calculated as the difference between what would have been lost without project activities (the baseline) and the emissions attributable to the project, minus any deductions for leakage, uncertainty and impermanence buffers. The carbon benefits achieved between 1997- 2005 by the Noel Kempff Mercado Climate Action Project were verified by Société Générale de Surveillance in 2005, using rigorous standards based upon those described in the Kyoto Protocol's Clean Development Mechanism. This verification made NK-CAP the first forest emissions reduction project to achieve such a standard, and demonstrates that REDD activities are capable of generating scientifically measurable, real, and verifiable carbon benefits.

Two distinct project components are generating carbon benefits within NK- CAP:

A) Reducing Emissions from Deforestation : By implementing an economic development program and an extended protection scheme, the project is avoiding deforestation by communities inside the project area. Baseline deforestation was modeled with a spatially explicit (GEOMOD) land use change model (see "Baseline" section for a detailed description), using Landsat imagery to estimate historic deforestation rates and modifying these rates based on monitoring from a reference area with comparable socioeconomic characteristic demands. As a result of the project, 763 ha were saved over the 1997- 2005 verification period, corresponding to 371,650 tCO^2e.

B) Reducing Emissions from Degradation : Cessation of logging in the former concessions that were incorporated into the project area avoids future timber extraction and collateral damage due to logging. 468,474 square meters of timber slated for harvest were protected over the 1997 – 2005 verification period, corresponding to an avoided 791,443 tCO^2e. The baseline harvest was modeled using an advanced statistical model (see "Baseline" section for a detailed description), simulating domestic/international timber supply and demand at different scales: national, regional, and project level[52].

Thus, the project (through both activities) generated a total carbon benefit of **1,034,107 tCO^2e over the 1997- 2005 verification period.** The annual breakdown of these benefits is shown in Figure 32 .

Figure 32 : Carbon benefits generated by NK- CAP.

Year	Carbon Offsets Component A (tCO2)	Carbon offset* Component B w/o leakage (tCO2)	Leakage Component B (tCO2)	Total Carbon Offsets (tCO2)	Emissions from Project Activities (tCO2)	Net Carbon Offsets (tCO2)
1997	56,401	48,180	7,264	97,317	168.59	97,148
1998	40,304	59,374	9,141	90,539	210.71	90,328
1999	39,783	69,931	10,960	98,753	281.81	98,472
2000	43,417	79,889	12,731	110,578	204.43	110,373
2001	41,158	89,298	14,454	116,003	166.81	115,836
2002	40,238	98,190	16,130	122,298	132.34	122,166
2003	33,972	107,081	17,589	123,462	108.65	123,353
2004	31,684	115,632	18,971	128,347	102.2	128,244
2005	44,693	123,867	20,277	148,282	96.39	148,186
1997 till 2005	371,650	791,443	127,516	1,035,578	1,471.93	1,034,107

Source: Noel Kempff PDD

[52]) Sohngen, B. and Brown, S., 'Measuring leakage from carbon projects in open economies: a stop timber harvesting project in Bolivia as a case study', Canadian Journal of Forest Research 34 (2004), 829 – 839.

4.22. History of Estimated Lifetime Carbon Benefits

The total carbon benefits from NK-CAP are expected to reach 5,838,813 tCO^2e over the life of the project (1997-2026).

The estimate of lifetime carbon benefits has been recalculated several times since the project began, resulting in considerable reductions from initial estimates and increases in accuracy. These changes, driven primarily by adjustments to the avoided deforestation and avoided degradation baselines, are a result of the pioneering nature of the project, which broke ground on methodologies for estimating baselines.

As a result of methodological advances, estimated lifetime carbon benefits were ratcheted down from the initial estimate of 53,093,442 tCO2e calculated in 1996, to the current estimate of 5,838,813 tCO2e calculated in 2005. The large decrease in the lifetime carbon benefit estimate is due primarily to a shift in reliance on interviews, secondary data sources, and reference documents from other parts of the world, to site specific studies, field measurements and advanced models, which are more robust and accurate.

See the “Baseline” section for a more in depth discussion of the current methodology being used to determine baselines for both the avoided deforestation and avoided degradation components of the project.

ADDITIONALITY

A project is termed “additional” if the emissions reductions experienced through project activities would not have been possible without the project. Determination of additionality is based upon the business-as-usual (BAU) scenario (in other words: what would have happened without the project?) and requires that the with-project scenario result in fewer emissions than BAU. Additionality is a requirement for the verification of carbon benefits and must be proven for verification to be granted.

Several tests are typically used to demonstrate a project's additionality, specifically: Were project activities required by law? Would project activities have been financially possible possible otherwise? Were the project activities common practice?

An answer of “no” to all three questions helps to establish additionality . NK-CAP met these tests of additionality on all three grounds.

NK- CAP was not required by Bolivian law to occur. Although there was a pre- existing park adjacent to the expansion area, expansion was not planned or required. A feasibility study, conducted prior to project implementation, demonstrated that the Government of Bolivia did not have the necessary funds or political will to close the forest concessions and expand the park. The funds provided by the project enabled changes to the status quo, by financing the buyout of timber concessions, the expansion of the park, and the community development activities aimed at reducing forest conversion. Without the project, logging would have continued in the concessions and deforestation would have spread around new settlements and communities lacking land titles, as this was the common practice.

As the Noel Kempff Mercado Climate Action Project fulfilled these requirements, the final, and most important, step to demonstrate additionality was to establish the business as usual emissions from the deforestation and degradation scenario and show that the project would reduce emissions below this baseline.

4.23. Baseline

A project baseline is the "without-project" or business-as-usual scenario; predictions of what would have happened had the project not been put into place. Methods of determining baselines range from the simple (basic historical data) to the complex (sophisticated computer models). The difference between the baseline and "with-project" scenarios is the first step in determining the carbon benefits of a project.

As the emissions reductions achieved through the Noel Kempff Mercado Climate Action Project were the result of a two-pronged strategy (avoiding deforestation and degradation), they were treated separately in the calculation of the project baseline. Both baselines have been re-estimated several times over the course of the past 10 years as new information, methods and technology became available, increasing the accuracy with each revision. Moving forward, the project baseline will be reevaluated every 5 years to maintain optimal accuracy.

Avoided Deforestation

The creation of an avoided deforestation baseline in NK-CAP involved 3 steps: 1) determination of deforestation rates, 2) determination of likely locations for future deforestation, and 3) determination of emissions resulting from anticipated deforestation.

Using satellite imagery from 1986, 1992 and 1996, it was possible to calculate historical deforestation rates in the project area. The location of future deforestation was simulated with the spatially explicit GEOMOD land use change model[53] using historical deforestation information as input. The model identified lands within the project that were statistically the most likely to be cleared, based on several deforestation drivers (distance to roads, towns, rivers, forest edge and prior disturbance). GEOMOD outputs provided a forecast of the forest area likely to be cleared over the following 30 years.

While remote sensing technology and modeling like GEOMOD can provide the estimated area of forest loss, estimating emissions from that forest loss involves measuring the carbon stock of the vegetation in the area. In NK-CAP, in order to quantify the emissions associated with the deforestation predicted by GEOMOD, it was necessary to assign vegetation classes to the areas predicted by GEOMOD to be cleared and to determine the carbon stocks associated with each vegetation class (different vegetation classes have different associated carbon stocks).

To this end, 625 permanent plots were established in NK- CAP to measure and monitor carbon stocks associated with the various vegetation classes found within project boundaries (including all carbon pools: aboveground and belowground biomass, litter, dead wood, and soils to 30 cm depth). Once these carbon stocks were estimated, the areas predicted to be cleared by GEOMOD were assigned a vegetation class (using Landsat imagery and on-the-ground observations). These carbon stocks, which were presumed cleared in the baseline scenario, were then converted into avoided carbon emissions.

Monitoring the Baseline

The avoided deforestation baseline will be re-evaluated every 5 years to capture any changes in institutional structure, law, national deforestation rates, etc. that would reduce the estimate's accuracy. A reference area was chosen adjacent to the Park to serve as a "control" for the

---

[53]) Myrna Hall, Geographical Modeling Services Inc.

estimated baseline. This area will be monitored over time using Landsat data and field samples and compared to the predicted baseline for the avoided deforestation component of NK- CAP. Differences between the two will be investigated and adjustments to the baseline will be made where appropriate to maintain accuracy.

Avoided Degradation

The avoided degradation baseline was determined using an econometric model of Bolivian timber markets, developed by Brent Sohngen and Sandra Brown[54], which projected the expected pathway of future harvests in Bolivia, both within the project area and the country as a whole (important for leakage analysis). The model was based on the assumption that Bolivia is a small open economy which is a price taker on global timber markets and, therefore does not significantly control or effect global prices. The baseline scenario predicted the volume which would have been harvested in the former concessions had the project not been undertaken. Within this baseline estimation of carbon emissions, damage due to logging, decomposition of dead wood, carbon storage in dead wood products and the difference in regrowth between logged and unlogged areas were all considered. Aboveground biomass and dead wood were the only carbon pools included in the calculations. For the calculation of carbon benefits and leakage estimation, the model was also run for the "with-project" scenario, both within the project area and for the country as a whole.

Monitoring the Baseline

Economic data for the Bolivian timber market was monitored through 2006 for use in re-implementation of the dynamic optimization model. In order to accurately estimate damage due to logging activities and to detect potential differences in regrowth rates between logged and unlogged areas, 102 plots (dubbed Carbon Impact Zones or CIZs) were established in a logging concession adjacent to the project area (named Cerro Pelao). From this, it was determined that the difference in regrowth between logged and unlogged areas was not statistically significant.

LEAKAGE

Leakage comes in two forms: activity-shifting (or primary) leakage and market (or secondary) leakage. Activity-shifting leakage occurs when a project causes carbon-emitting activities to be shifted to another location, canceling out some or all of the project's carbon benefits. Market leakage, on the other hand, occurs when changes in supply subsequent to project initiation affect market prices, thus increasing activity intensification elsewhere. Projects must analyze the risk of, compensate for, and monitor leakage as part of project management in order to accurately predict carbon benefits.

Since it was possible that project activities could displace emissions elsewhere, every attempt was made to account for the quantity of potential leakage, while specific safeguards were also built into the NK-CAP project design to help avoid leakage. As there were two emissions reduction activities occurring in the project (avoided deforestation and degradation), they were treated separately in the leakage analysis.

---

54) Sohngen, B. and Brown, S., 'Measuring leakage from carbon projects in open economies: a stop timber harvesting project in Bolivia as a case study', Canadian Journal of Forest Research 34 (2004), 829 – 839.

4.24. Avoided Deforestation

Estimation and Prevention of Leakage

Since the establishment of the project, the largest short-term risk for activity shifting leakage existed from the communities living along the border of the extended park area. As such, these communities were the focus of leakage prevention activities associated with the project design, including educational campaigns, workshops in sustainable agriculture, application for land tenure and development of a management plan for ancestral lands. It was estimated that there was no risk of activity shifting leakage from avoided deforestation activities if the prevention activities detailed below were carried out.

Perhaps the most successful aspect of the community development leakage avoidance activities was the creation of a 360,565 hectare TCO (officially titled indigenous territory). Border communities helped design the Bajo Paragua Native Communal Land Natural Resources Management Plan for this area and sustainable forestry activities undertaken in the TCO lessened pressure to deforest within project boundaries.

The sustainable harvesting activities occurring in the TCO are NOT counted as primary leakage. As the TCO's forestry use lies almost completely inside the area of former timber concessions (see), this is not an increase in emissions as a result of the project- logging would have occurred there anyway as it was BAU within the former concessions. The community forestry activities actually result in fewer emissions than would otherwise occur, due to the switch to sustainable management.

Figure 33 :
The sustainable forestry activities carried out by border communities fall almost entirely within the former timber concessions (black hatched).

Source: FAN

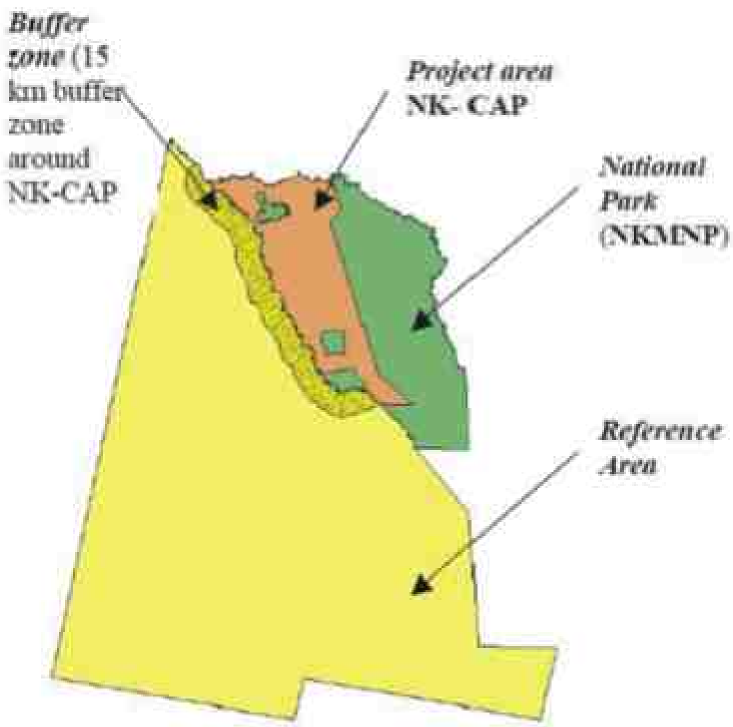
Monitoring Leakage

The project used a geographically based method to detect leakage, employing a 15 km buffer around the borders of the NK-CAP zone to capture possible activity shifts (see). The rationale behind the chosen buffer width was based on behavioral theory; it was highly unlikely that subsistence farmers who were originally deforesting within the project area, without access to cars or other personal transportation, would travel large distances to deforest elsewhere.

A baseline deforestation scenario for the buffer zone was created in the same manner as for the NK-CAP itself. If leakage were occurring, the deforestation rate in the buffer area would be higher than in its baseline scenario and the difference between the two would be the leakage, after standardizing for any changes in overall deforestation rate represented by the reference area.

Subsequent monitoring has revealed that deforestation in the buffer zone is actually lower than that which was predicted in the buffer baseline, leading to the conclusion that no activity- shifting leakage is currently occurring for the avoided deforestation aspect of the project.

Figure 34 : Map of NK- CAP project area, original NKMNP, buffer zone (for leakage analysis), and reference area (for baseline monitoring).



Source: NK- CAP PDD

4.25. Avoided Degradation

Estimation and Prevention of Leakage

In estimating potential market leakage, project developers ran into difficulties teasing out the effects of project activities from the overall 75% reduction in timber concessions mandated by the Bolivian government in 1996, as well as insufficient data on harvests and prices prior to 1996. For this reason, it was decided not to compare harvests in other concessions over time, but to instead employ the dynamic optimization timber model developed specifically for Bolivia by Brent Sohngen and Sandra Brown (see "Baseline" section for a detailed description). The difference between the modeled total annual timber production for all of Bolivia "without-project" was compared with the modeled total annual timer production for all of Bolivia "with-project". Various scenarios of price elasticity and capital constraints were explored, resulting in estimates of 14-44% leakage. The higher leakage scenario illustrates one that prices are highly sensitive to supply changes.

Because timber prices in Bolivia are not highly sensitive to supply changes (the country is considered a "price-taker" not "price-setter"), a final leakage estimate of 14% was used. Calculated leakage from 1997- 2005 totaled **127,515 tCO^2e** and was subtracted from the carbon benefits for that verification period.

The purchase and retiring of harvesting equipment from concessionaires was a key leakage prevention activity undertaken for NK-CAP. Many concessionaires take out loans when purchasing equipment, thus must harvest to generate income and pay off the loans. Purchasing

and retiring the equipment took away the need for concessionaires to continue with harvest activities. Furthermore, it prevented the possibility for equipment to be sold inexpensively to other harvesters when the indemnified concessionaires left the business.
Otherwise, the equipment could have contributed to the expansion of harvest activities elsewhere.

Monitoring Leakage

In order measure potential activity shifting leakage, it was necessary to follow the activities of the concessionaires after they relinquished their holdings. The Agreement to Prevent the Displacement of NK- CAP Environmental Benefits, signed on January 16, 1997 by the former concessionaires, prevented them from initiating new logging activities for a period of five years, as well as allowed FAN to track their activities outside the project area.

FAN closely tracked the expenditures of indemnification funds made by these individuals, most importantly to determine if funds were reinvested into other concessions. This monitoring revealed that the majority land holder left the timber industry entirely, while the minority holder re-invested a small amount (7.3% of the indemnification funds) into a nearby concession, which underwent harvests in 1997 and 1998. This was not counted as primary leakage in the analysis because a portion of the harvests had already been modeled in the Bolivian timber model, thus to count them here would be double-counting.

As explained in the previous section, community forestry activities in the TCO (indigenous territory) were not considered leakage, since activities occur within former timber concessions and are planned to be far less intense than harvest regimes previously used. However, timber extraction is still being monitored in the area to assure that communities harvest according to the sustainable management plan.

PERMANENCE

Permanence refers to how robust a project is to potential changes that could allow for stored carbon to be released at a future date. Although all sectors have the potential for impermanence, forest carbon projects face particular scrutiny due to a perceived risk that poor management, fire, pests, etc. can lead to the destruction of forest and the subsequent release of emissions. Various strategies can be used to safeguard against impermanence, including the purchase of conservation easements, creation of protected areas, community development, establishment of project management and monitoring endowments, the use of carbon buffers, etc. Ultimately, strategies must be tailored to the particular project site and situation.

Permanence of carbon benefits generated by the Noel Kempff Mercado Climate Action Project is safeguarded by legal, financial and institutional means.

The project area has been incorporated into a national park, as legally designated by the Government of Bolivia, with effective protection under the auspice of the National Service of Protected Areas (SERNAP) and FAN Bolivia as the project administrator. Through the project, an endowment has been established to fund the protection and management of the expanded Noel Kempff Mercado National Park in perpetuity, including rangers, equipment, and infrastructure to protect the park. After the project ends, the endowment fund must be used for the benefit of the Noel Kempff Mercado National Park according to the endowment fund agreement. Risk of fire was considered in the calculation of project carbon benefits as a 5%

discount, using the actual occurrence of fires prior to the first verification to determine this number.

VALIDATION AND VERIFICATION

A two-step process exists for independent, third-party review of carbon projects. The first step, validation, is a process designed to confirm that the Project Design Document (PDD) meets the stated requirements and identified criteria of the specific voluntary or compliance market project standard under which the project has been designed. Verification is the second step, a process by which claimed carbon benefits from a validated project are confirmed. These procedures were created to ensure that projects are of high quality and the benefits generated by them are real and measurable.

When the Noel Kempff Mercado Climate Action Project was first begun in 1996, there were not any specifications for carbon project design or validation. However, the United States, as a signatory to the United Nations Framework Convention on Climate Change (UNFCCC), had begun a program called the United States Initiative on Joint Implementation. The project was submitted under these guidelines, and received approval in 1996. After the U.S. failed to ratify the Kyoto Protocol, this system became obsolete. Since REDD projects were also excluded from the Kyoto Protocol's Clean Development Mechanism, it was not possible to validate or verify NK-CAP under a compliance regime.

Thus, the NK-CAP PDD underwent an ex-post validation assessment in August 2004. The validation was executed by Société Générale de Surveillance (SGS), registered as a Designated Operational Entity to the Clean Development Mechanism (CDM). As no official REDD voluntary standard existed at the time of project initiation, SGS, in coordination with TNC, created their own methodology based upon the CDM, and validated/verified against this protocol. SGS applied the CDM guidelines for afforestation/reforestation-projects (as defined October 2005). In particular, the project's additionality, baseline, potential leakage, monitoring plan and environmental and social impacts were assessed against the relevant UNFCCC and Kyoto Protocol requirements (where appropriate), host country criteria and the guiding principles of completeness, consistency, accuracy, transparency and scientific appropriateness.

The first attempt at validation resulted in several Corrective Action Requests (CARs) to improve the PDD. These corrections were made and the project received validation from SGS in 2005. It is important to note that although the project standards were *based on* the CDM guidelines, Reducing Emissions from Deforestation and Degradation (REDD) does not currently represent an eligible emissions reduction activity under the CDM.

Validation Findings

SGS' opinion is that the project does currently meet the relevant criteria for CDM project activities and fulfils the principles detailed above.

*SGS validation statement, Executive Summary, November 2005*1.1. Project Design Document (PDD)

4.26. Project Design Document (PDD)

The Project Design Document (PDD) of NK-CAP, including all methodologies applied and related annexes can be downloaded at:

http://conserveonline.org/workspaces/climate.change/ClimateActionProjects/NoelKempff/NKPDD/PDDZip/view.html

The Noel Kempff Mercado Climate Action Project had the same entity, SGS, complete the verification processes. During an initial site visit in 2004, several findings were made that required additional data and clarification of methodologies. The requested changes were subsequently made, and additional information provided, leading to verification of the emission reductions in 2005 for the period of 1997- 2005 (see in the "Carbon Benefits" section for the annual breakdown). A total of **1,034,107 metric tons of CO^2** were verified.

Verification Findings

SGS' opinion is that the project has implemented a monitoring plan and prepared a monitoring report that determines additional sequestration and emissions reductions due to the project's activities in a manner consistent with the principles detailed above. Consequently, SGS verifies the voluntary emissions reductions claimed by this project as outlined in the Schedule of Achieved Voluntary Emissions Reductions (SAVER) that accompanies this verification opinion.

SGS verification statement, Executive Summary, November 2005

For more information contact:

Natalia Calderón Angeleri, ***Coordinator Noel Kempff Climate Action Project***
Fundación Amigos de la Naturaleza (FAN Bolivia)
Casilla 2241
Phone: +591-3-3556800
Fax: +591-3-3547383
Email: **ncalderon@fan-bo.org**

Zoe Kant, ***Carbon Finance Specialist***
The Nature Conservancy
4245 N. Fairfax Drive, Suite 100
Arlington, VA 22203 USA
Phone: +1-703-841-5371
Email: **zkant@tnc.org**

PROJECT: REDUCING CARBON EMISSIONS FROM DEFORESTATION IN THE ULU MASEN ECOSYSTEM, ACEH, INDONESIA

Aceh province has a population of just over four million people and lies at the northern tip of the island of Sumatra in Indonesia. The Province retains the largest contiguous area of forest left in Sumatra, of which the Ulu Masen ecosystem forms the northern-most forest ecosystem. The REDD project area in the Ulu Masen ecosystem covers 750,000 hectares.

The Ulu Masen mountains are known to support a diversity of forest types due to their complex geology, climate types, soil types and altitudinal range. Forest types consist of lowland broadleaf forest, pine forest, submontane broadleaf forest, montane broadleaf forest, and other forests lesser forest types. Most of the rich lowland forests that covered the plains along the coast have been converted to agriculture and other uses. In most areas above 500 meters there are still substantial areas of high quality forest. The vast majority of the project site is designated at national forest land (*Hutan Negara).*

The Governor of Aceh, an International Conservation Organization and a carbon broker joined forces to establish a project to reduce emissions arising from deforestation and forest degradation in the Ulu Masen forest estate. This case study outlines some of the key factors taken to prepare for this project.

Estimating Forest Carbon Stocks

The most commonly accepted way to estimate forest carbon stocks over larger areas is to apply carbon values to broad forest classes; the 'biome-average approach' (which is an approach required by Tier 1 of the IPCC's National Greenhouse Gas Inventories). Total above ground biomass for a moist tropical Asian forest is estimated by the IPCC at 350 tonnes per hectare or 225 tonners per hectare of carbon. The project proponents however averaged out four other biome models with the IPCC model and estimated 188 tons of carbon on average per hectare in the Ulu Masen ecosystem, of which 20% is assumed to be below ground (150 tC above ground and 38 tC below ground). Only above ground biomass is considered and understory vegetation, coarse woody debris, or litter are not included as these values are typically substantially less than 10% of total carbon biomass.

Further assumptions made to estimate forest carbon stocks were:

- Disturbed forests have 75% of the carbon stocks compared to intact forests;
- 74% (558,382 ha) of the forests in Ulu Masen are intact and 26% are degraded (192,146 ha); and
- Altitude impacts on forest growth and therefore carbon stocks (see table below).

Based on the above assumptions and calculations, the project area has an estimated 140,771,670 tons of forest carbon.

Forest Type Elevation (m)	Condition	Hectares	Total Carbon	Average tC/ha
0-500	Intact	132,547	27,834,870	210
	Disturbed	162,759	26,041,440	160
500-1000	Intact	220,814	44,162,800	200
	Disturbed	28,078	4,211,700	150
1000-1500	Intact	143,732	27,309,080	190
	Disturbed	1,309	183,260	140
>1500	Intact	61,289	11,028,520	180
	Disturbed	0	0	n/a
TOTAL		**750,528**	**140,771,670**	**188**

The project proponents consider this to be a conservative figure as it is 15% lower than the IPCC's estimated average for similar forest types.

Communities

Aceh is typical of many resource-rich regions where resource extraction has not improved the welfare for the majority of the population. Almost 50% of the Aceh population lives below the poverty line – down from 20% in 1999.

The tsunami caused incomprehensible damage and loss of live to the province and the people and economy have furthered suffered from civil conflict that has been ongoing for several decades.

Approximately 130,000 people live in communities adjacent to forest areas of the Ulu Masen ecosystem. Dominant agricultural land uses in the lowlands include coconut groves along the coast followed inland by rice paddies, rubber gardens, small holder coffee and cacao garden, complex agroforests with fruit trees and nutmeg trees, and to a lesser extend upland fields with annual crops.

There is a small timber industry in Aceh processing around 9,000 cubic meters of timber per year. It is estimated that 4,400 people are employed in the timber industry and a further 2,000 to 3,000 villagers participate in small-scale illegal logging operations for highly valuable hardwood species. The lack of mechanization has meant little conversion of forest to other land uses, and the Tsunami and conflict has tended to further reduce illegal logging activities. But with the reduction in tsunami funding from donor agencies, illegal logging is expected to increase as some community members act to supplement their cash income.

Non-timber forest products extracted from the forest include rattan, honey, bird nests and a variety of bush meats.

Typical boom-bust agricultural trends have occurred at various times driven by market trends. Wildlife trade has supplemented incomes for several communities, particularly products such as rhinoceros horns, tiger body parts and elephant ivory.

Biodiversity

The mountain, hill and lowland ecosystems of Aceh support high levels of plant and animal biodiversity including the Sumatran rhinoceros, tiger, orang-utan and elephant. These populations remain the best hope for survival of many of these species in the wild. 700 species of vertebrates have been recorded, including 320 birds, 176 mammals, 194 reptiles and amphibians. 8,500 different species of plants have been recorded in the neighboring Leuser ecosystem.

Threats to the forests of Aceh include logging (legal and illegal) and the conversion of forest for new roads, infrastructure and plantation crops. Official government estimates suggest forests of Aceh continue to disappear at a rate of approximately 21,000ha per year. Deforestation and fragmentation is a major threat to biodiversity.

Baseline Projections

In the year prior to the tsunami, 47 companies in Aceh were granted logging licenses. This was a rise of more than 150% over previous years. Since the tsunami and the end of conflict, there has been a dramatic increase in illegal and unsustainable logging, land clearance and applications for land clearance. New threats are also emerging with the ending of the state of emergency and the opening of the economy for much needed investment. Rapidly developing new markets for palm oil and bio-fuels are fuelling a surge in demand for land to establish plantations.

There are currently 6 logging licenses in the project area, covering 404,704 hectares. These licenses, though currently inactive due to the conflict and Tsunami, could be reactivated by the Ministry of Forestry with support from the local governments. In addition to the concessions already granted, almost 60% of the total forest area can be legally logged, whether the area has been assigned as a logging concession or not.

Of Aceh's total forest estate of 739,748 hectares, 310,991 hectares are protected (generally very weakly) and 58% of this area is zoned for logging. A further 428,757 hectares is unprotected forest. Significant logging or forest conversion will occur in the forest estate unless “dramatic steps are taken”.

Classification	Legal Classification	Forest (Intact)	Forest (Disturbed)	Forests no Classified as Forest	TOTAL
Protected Forest	Protected natural reserve (federal)	13,086	147	2,632	15,865
	Semi-protected forest (watershed)	279,727	3,598	9,316	292,641
	Protected Area (province/district)	1,536	197	752	2,485
	TOTAL PROTECTED	**294,349**	**3,942**	**12,700**	**310,991**
Unprotected Forest	Zoned for Logging	183,949	76,994	13,245	274,188
	Zoned for Logging: Timber and pulp	43,028	19,532	4,711	67,271
	Community Development Zone (can be logged)	3,313	1,317	651	5,281
	Unprotected Forest (Province/district)	21,634	50,032	10,351	82,017
	TOTAL UNPROTECTED	**251,924**	**147,875**	**28,958**	**428,757**
	TOTAL FOREST ESTATE	***546,273***	***151,817***	***41,658***	***739,748***

There is a lack of technical guidance for establishing credible reference land use scenario or reference emissions scenario for REDD baselines. Plus the cost of developing land-use scenarios is not cheap or easy. The project proponents therefore considered three deforestation scenarios:

- A low deforestation scenario with an annual forest lost of 0.86% based on a soon to be published study;
- A high deforestation scenario with an annual forest lost of 2.3% based on historical deforestation rates for Sumatra; and
- Project deforestation scenario with an annual forest lost of 1.3% based on 87 unique combinations of elevation, legal class, forest condition and threat.

Using a deforestation rate of 1.3% per annum, an annual loss of 9,630 hectares per year or 289,000 hectares over the project life (30 years) was estimated. This corresponds to 38% of the project area being deforested without preventative action.

Based on this and the estimated carbon per unit area, it is estimated that the Ulu Masen project area will contain 108,364,096 tons of carbon in 30 years time (2039 stocks).

The project will stop an estimated 85% of legal and illegal logging by using carbon finance to reclassify land and permanently eliminate the legal possibility of land conversion and logging. (Not all legal and illegal logging can be stopped). Therefore the project expects to generate 27,546,438 tons of avoided carbon credits over 30 years (or 101,095,427 CO_2 credits).

	2008 - Current Stocks	2038 Stocks	Emissions	Project Emission Reductions
Baseline	140,771,670	108,364,096	32,407,574	N/A
Project	140,771,670	135,910,534	4,861,136	27,546,438

The project baseline studies also considered:

- Communities : Under the project, sustainable forestry programmes are encouraged and therefore the project does not expected significantly different employment outcomes. The project proponents believe that conservation measures will also deliver greater livelihood benefits to communities over the medium to long term.
- Biodiversity : There are no reliable estimates of the biodiversity loss that could be expected from continued deforestation in the project area. But the loss of nearly a third of the forest area of 30 years would have to significant negative impacts on biodiversity in the project area.
- Water and Soil Resources : Water contamination and soil erosion are likely to increase in a 'business as usual' baseline scenario due to increased deforestation and forest degradation. A study carried out in a neighboring protected area concluded that a deforestation scenario similar to one considered for Ulu Masen generates substantially less water supplied to community households

Proposed Project Activities

The Governor of Aceh has made a commitment to reduce the areas of forest for logging and clearing in return for carbon finance. Immediate activities are to revise provincial and district spatial plans, reduce the forest area classified as conversion forest, and increase the area under a range of formal permanent forest estate categories. The Government of Aceh will establish an institutional framework at provincial, district and community levels to oversee and advise forest classification and project implementation. Carbon finance funds will provide incentives to communities, districts and the province to re-classify lands currently slated for logging. Communities have indicated a strong willingness to participate provided there are financial incentives for conserving forests.

The project will help curb illegal logging through support for enhanced enforcement, community agreements, increased employment and income for local people, recruiting forest wardens, conducting forest monitoring and patrols, and improving synergies through law enforcement and other relevant agencies. The project will also provide alternative livelihoods to forest-adjacent communities and provide funding and technical assistance to communities that agree to protect the forest. The government of Aceh has recently hired almost 1,000 new forest wardens (many whom are community-based) and there are plans to expand this initiative with additional project finance.

The project will use carbon finance to assist reforestation and restoration of mangroves, fruit tree gardens, coffee plantations and woodlots. These will be developed based on needs and priorities identified in the spatial planning and community outreach process of the project.

A project implementation unit, tentatively called the Ulu Masen Implementation Board will be established at the provincial level for project management and technical assistance. Multistakeholder management boards will also be established within the five participating districts to provide oversight for project implementation at district and village levels. Civil society organizations will also be given a role in independent monitoring of project activities.

Timeframe and Project Accounting

The project timeframe is 30 years to account for changes in carbon emissions between the baseline and project scenario. However, the project will insure permanence of avoided emissions for a period of 100 yeas. This allows for:

a) A reasonable estimate in the medium term (30 years) for baseline reviews and carbon accounting, while;

b) Also ensuring the longevity of carbon credits for a period of time that is relevant for climate change and atmospheric CO_2 levels.

The project will store a significant amount of carbon credits in a buffer account that will be used after the 30 years of the project period to continue implementing and funding core project activities, notably conservation and restoration of forests.

Project Risks and Mitigation Measures

Identified project risks have been divided into short and long term risks:

Short term

- Baseline risk
- Leakage risk
- Measurement risk

Long term

- Project implementation
- Sovereign, legal and enforcement risk
- Natural risk (fire, disease, pests etc)
- Climate change risk (especially increases in fire)
- Return of conflict to Aceh, other political instability

Risk management arrangements to protect the stored forest carbon have two elements:

1. A "risk management buffer" of reserved credits, proposed to be 10% of the stream of Verified Emission Reductions (VERs).
2. Placement of 20% of the stream of VERs into a revolving fund which will invest in other sustainable development projects which are expected to generate further emission reductions or sequestration. This may include mini and micro hydro projects, reforestation, agroforestry, biomass power generation, biofuel production and use.

These risk management arrangements are designed to give assurance to buyers of VERs and Certified Emission Reductions (CERs) of the long term integrity of the carbon offset, and to maximize the contribution of the project and subsequent carbon financing to economically, environmentally and socially sustainable development. A global reinsurance company has insured credits for 100 years to address issues of permanence.

Estimating and Mitigating Leakage

The project proponents believe the two most critical types of leakage caused by the project will be out-migration of illegal loggers (activity-shifting) and possible increases in forest products in the short-term (until reforestation and sustainable forest management programs are at sufficient scale). It is estimated that these two types of leakage will occur in the first five years of the project. The project proponents do not believe negative leakage from activity-shifting or markets will exceed 10%.

The project will address leakage issues through large-scale and integrated activities such as forest conservation, forest restoration and sustainable community forest management. The Ulu Masen project is large enough to eliminate activity-shifting leakage from one community to another. With more forest resources being sustainably grown and managed, there will be less need for loggers to move their operations to other areas.

This project will decrease logging of natural forests which could theoretically decrease the supply of forest products (price increase). At the same time planting of trees, orchards, mangroves and fruit farms as well as developing sustainable community forest management practices, including possibly timber production, should increase the supply (price decrease). These counter-acting forces should neutralize market leakage.

Monitoring of activities causing leakages will be extended beyond project boundaries through remote sensing and establishment of permanent plots. Specifically the project will continue to monitor changes in deforestation rates outside the project area. The project will also track activities of resource users affected by project activities as an effective means for capturing activity-shifting leakage.

Monitoring

The project will monitor over time: deforestation rates (including legal and illegal logging), biodiversity, livelihoods, leakage (especially offsite climate and community impacts), impacts of climate change on the project area (notably fires), participation of stakeholders and civil society in the evolving project design and implementation, and in-migration (people from surrounding communities coming into the project area to receive carbon finance). The Ulu Masen Implementation Board (UMIB) will develop a monitoring plan for the project.

Radar imagery (likely to be available through the Governments of Indonesia and Australia) will be used to monitor illegal logging in the mountains of Aceh and assess changes that have taken place over time as a result of forest felling, road building, or even landslides and natural tree falls. The project will equip and train airborne monitoring teams to fly 'Ultra Light' aircraft with high resolution photography to assess and monitor carbon stocks, both in the pilot areas and in surrounding forest blocks. Aerial assessment will be supported through ground truthing of carbon stocks. As the project develops and more sophisticated carbon assessment and modeling tools and techniques are developed, greater accuracy in the monitoring outcomes is expected.As noted, a credit reserve comprising 20% of credits generated by the project will be held until reconciliation of the project level accounts against the national baseline. Project proponents believe this is a responsible way to ensure they can “cover” any detected leakage as the project matures.

The project will also monitor community outcomes of the project, both within and outside the project areas. Emphasis will be placed on benefit sharing mechanisms to avoid in-migration to the project area. Civil society organizations will be supported to conduct independent monitoring of forest crimes, performance of logging concessions and community logging operations as well as forest protection activities and education and outreach activities.

Full camera trapping programs will commence to monitor flora and fauna changes. Water and hydrological studies and soil surveys will be conducted in critical watershed to see if the project is having a (possible) impact.

Information adapted from the Project Design Document titled '*Reducing Carbon Emissions from Deforestation in the Ulu Masen Ecosystem, Aceh, Indonesia: A triple-Benefit Project Design Note for CCBA Audit* , submitted by the Provincial Government of Nanggroe Aceh Darussalam (Aceh) in collaboration with FFI and Carbon Conservation to CCBA on 29 December 2007.

ANNEX 1 :
Glossary

The following glossary has been adapted from the WWF document 'Making Sense of the Voluntary Carbon Market A Comparison of Carbon Offset Standards', published in March 2008. Further terms have been added from the report by the Poverty Environment Partnership titled 'Making REDD Work for the Poor' (second draft published in May 2008).

Further glossaries provided by the IPCC (http://www.ipcc.ch/glossary/index.htm) and UNFCCC (http://unfccc.int/essential_background/glossary/items/3666.php) are also very important reference source.

Additionality : The principle that only those projects that would not have happened anyway should be counted for carbon credits.

Afforestation : The process of establishing and growing forests on bare or cultivated land, which has not been forested in recent history.

Agriculture, Forestry, and other Land Uses (AFOLU) : Following the 2006 IPCC Guidelines for national greenhouse gas inventories, the AFOLU consolidates the previous sectors LULUCF (Land Use, Land Use Change and Forestry) and agriculture. Note that while this consolidation has been adopted by IPCC, and the Guidelines have been published as a scientific publication, the decision of the use of the Guidelines for UNFCCC and Kyoto Protocol reporting has not been taken yet.

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 industrialised 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.

Assigned Amount Unit (AAU) : A tradable unit, equivalent to one metric ton of CO_2 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 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.

Baseline-and-credit system : More credits are generated with each new project implemented. Projects that are implemented outside of a cap-and-trade system.

Cancellation : see Retirement

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 fuCarbon 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 Offset Project : An emissions reduction project that generates carbon offset credits; one carbon offset unit represents the reduction of one metric ton of carbon dioxide, or its equivalent in other greenhouse gases.

Carbon rights : A carbon right is a right to the benefits and risks arising from carbon sequestration and release on a specified parcel of land. Carbon rights may have a financial value where a market exists for GHG emissions offsets. Carbon rights can also define the management responsibilities associated with a specific forest area. Issues around carbon rights include how the rights are defined, how they work in places where land ownership is unclear and whether legal institutions are strong enough to protect the rights.

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.

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).

Compensated Reduction (CR) : A proposal (see Santilli et al 2005 published in Climate Change 71: 267-276) recommending the creation of positive incentives for developing countries to reduce emissions from deforestation. The voluntary agreement would compensate countries that demonstrate quantifiable decreases in deforestation (below a set baseline based on average historical deforestation rates). Many of the current proposals for REDD are based on a similar methodology.

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 credits.

Deforestation : Most definitions characterize deforestation as the long-term or permanent conversion of land from forested to non-forested. The UNFCCC Conference of the Parties defined deforestation as "the direct human-induced conversion of forested land to non-forested land." The FAO defines deforestation as "the conversion of forest to another land use or the long-term reduction of the tree canopy cover below the minimum 10 percent threshold".

Degradation : According to the FAO, forest degradation refers to "changes within the forest which negatively affect the structure or function of the stand or site, and thereby lower the capacity to supply products and/or services".

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.

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. Registries are usually created in order to avoid this problem.

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 CO_2 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-effective 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 I (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.

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.

Greenhouse Gases (GHGs) : Gases that cause climate change. The GHGs covered under the Kyoto Protocol are: CO_2, CH_4, N_2O, HFCs, PFCs, and SF_6

High Forest Low Deforestation countries : countries that have high forest cover with low amounts of deforestation. Examples are Panama, Colombia, Democratic Republic of Congo, Peru, Belize, Gabon, Guyana, Suriname, Bhutan and Zambia, along with French Guiana as containing 20 percent of Earth's remaining tropical forest and 18 percent of tropical forest carbon.

Host Country : The country where an emission reduction project is physically located.

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) equal 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).

Kyoto Mechanisms : The three flexibility mechanisms that may be used by Annex I Parties to the Kyoto Protocol to fulfil 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.

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.

Land Use, Land Use Change and Forestry (LULUCF) : Land use, land use change and forestry. The term given to tree-planting projects, reforestation and afforestation, designed to remove carbon from the atmosphere.

Market-based carbon offsets : A financial instrument representing a reduction in GHG emissions that can be bought and sold in either the larger compliance market (where governments, companies and other entities buy offsets in order to comply with their emissions reduction goals) or the smaller voluntary market (where offsets can be purchased to voluntarily mitigate GHG emissions).

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 recognises the importance of creating a global partnership for development. The goals have been commonly accepted as a framework for measuring development progress.

No-harm principal : The general notion that GHG mitigation activities such as reducing emissions from deforestation do not indirectly cause harm to the livelihoods of the poor living in or near the forest areas.

Non-Annex 1 Countries : A group of mostly developing countries which have not been assigned emissions targets under the Kyoto Protocol and which are recognised by the UNFCCC as being especially vulnerable to the effects of climate change.

Offset Company : A company whose primary purpose is to create or sell offsets, either directly to consumers or through another organisation that wish to offer offsets to their clients.

Offset Provider : Offset providers include both offset companies and other businesses that utilize the services of offset companies to provide offsets to their clients.

Payments for Environmental Services (PES) : A voluntary, negotiated transaction (distinguished from a command-and-control measure) where an environmental service (e.g. carbon sequestration, watershed protection, biodiversity conservation) is being 'bought' by an environmental service buyer. Payment schemes may be a market arrangement between willing buyers and sellers, or may be government driven, where public revenues are used to pay for ecosystem services.

Permanence : Refers to the issue of duration and reversibility of a reduction in GHG emissions. There are risks that the net carbon uptake from a forestry project may be reduced at some point by re-release into the atmosphere. This reduction in carbon stocks is referred to here as the “permanence” issue. Because aforestation and reforestation create carbon sinks (removal of CO_2 from the atmosphere), carbon will be re-released into the atmosphere if the projects are not permanent. Because a reduction in emissions from deforestation and degradation preserves carbon stocks (carbon that is accumulated and contained in a 'pool' or reservoir), a temporary REDD program will release carbon that was being stored the forest, though it will have delayed some emissions into the atmosphere from occurring. To avoid the issue of reversibility on both accounts, the multiple drivers of deforestation must be addressed. The mechanisms to do this therefore must be resistant to changes in government policy and global fashion, as well as the human and biological impacts of climate change

Pre-registered Emission Reductions (pre-CERs) : A unit of greenhouse gas emission reductions that has been verified by an independent auditor but that has not yet undergone the procedures and may not yet have met the requirements for registration, verification, certification and issuance of CERs (in the case of the CDM) or ERUs (in the case of JI) under the Kyoto Protocol. Buyers of VERs assume all carbon-specific policy and regulatory risks (i.e. the risk that the VERs are not ultimately registered as CERs or ERUs). Buyers therefore tend to pay a discounted price for VERs, which takes the inherent regulatory risks into account.

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-based system : see Baseline-and-credit system

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.

ANNEX 2 :
Bibliography

Glossary

Kollmus, A., H. Zink, C. Polycarp. 2008. Making Sense of the Voluntary Carbon Market: A Comparison of Carbon Offset Standards. WWF Germany. (http://assets.panda.org/downloads/vcm_report_final.pdf)

Peskett, L., D. Huberman, E. Bowen-Jones, G. Edwards, and J. Brown. 2008. Making REDD Work for the Poor. *A Poverty and Environment Partnership Report*. (www.**povertyenvironment**.net/pep/?q=fi**le**store2/**d**ownl**o**a**d**/1852/**Making-REDD-work-for-the-poor**-FU**LL**-050608.pdf*)*

Chapter 1.1 : The Background on Climate Change

Hansen, J. M. Sato, P. Kharecha, D. Beerling, V. Masson-Delmotte, M. Pagani, M. Raymo, D. Royer, J. Zachos. 2008. Target Atmospheric CO_2: Where should humanity aim?

IPCC, 2007: Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, Pachauri, R.K and Reisinger, A. (eds.)]. IPCC, Geneva, Switzerland, 104 pp. (http://www.ipcc.ch/ipccreports/ar4-syr.htm)

IPCC, 2007: Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 996 pp. (http://www.ipcc.ch/ipccreports/ar4-wg1.htm)

IPCC, 2007: *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change,* M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson, Eds., Cambridge University Press, Cambridge, UK, 976pp. (http://www.ipcc.ch/ipccreports/ar4-wg2.htm)

IPCC, 2007: *Climate Change 2007: Mitigation. Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [B. Metz, O.R. Davidson, P.R. Bosch, R. Dave, L.A. Meyer (eds)], Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA., XXX pp. (http://www.ipcc.ch/ipccreports/ar4-wg3.htm)

Meehl, G.A., W.M. Washington, C.M. Ammann, J.M. Arblaster, T.M.L. Wigley, and C. Tebaldi. 2004. Combinations of Natural and Anthropogenic Forcings in Twentieth-Century Climate. *Journal of Climate*, vol. 17, pp. 3721-7. (http://www.bom.gov.au/bmrc/clfor/cfstaff/jma/meehl_additivity.pdf)

Pittock, B. 2003. Climate Change - An Australian Guide to the Science and Potential Impacts*.*

Australian Greenhouse Office. (http://www.climatechange.gov.au/science/guide/)

Chapter 1.2 : The Role of Forests in Climate Change

Achard, F., Eva, H. D., Stibig, H., Mayaux, P., Gallego, J., Richards, T. and Malingreau, J., 2002. Determination of Deforestation Rates of the World's Humid Tropical Forests. *Science,* Vol. 297. no. 5583, pp. 999–1002.

G. B. Bonan. 2008. Forests and Climate Change: Forcings, Feedbacks, and the Climate Benefit of Forests. *Science*, Vol. 320, 1444-1449.

Houghton, R.A. 2005. Tropical Deforestation as a Source of Greenhouse Gas Emissions. In: Moutinho, P. and S. Schwartzman. 2005. *Tropical Deforestation and Climate Change*. Amazon Institute for Environmental Research

IPCC 2006, 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Prepared by the National Greenhouse Gas Inventories Programme, Eggleston H.S., Buendia L., Miwa K., Ngara T. and Tanabe K. (eds). Published: IGES, Japan.

United Nations Food and Agriculture Organization (FAO). 2006. Global Forest Resources Assessment 2005: Progress toward sustainable forest management. (http://www.fao.org/forestry/fra2005/en/)

United Nations Food and Agriculture Organization (FAO). 2007. State of the World's Forests 2007. (http://www.fao.org/docrep/009/a0773e/a0773e00.htm)

World Resources Institute - Climate Analysis Indicators Tool (CAIT) Database: http://cait.wri.org/

Chapter 1.3 : Drivers of Deforestation

Chomitz, K. 2007. At Loggerheads? Agricultural Expansion, Poverty Reduction, and Environment in the Tropical Forests. *The World Bank.* (http://go.worldbank.org/TKGHE4IA30)

Geist, H. and E. Lambin. 2001. What Drives Tropical Deforestation? LUCC International Project Office.

Geist H. and E. Lambin, 2002. Proximate Causes and Underlying Driving Forces of Tropical Deforestation. *BioScience,* Vol 52 No 2.

Kanninen, M. et al. 2007. Do Trees Grow on Money? The implications of deforestation research for policies to promote REDD. Center for International Forestry Research (CIFOR) (http://www.cifor.cgiar.org/Publications/Detail.htm?pid=2347)

Moutinho, P. and S. Schwartzman. 2005. Tropical Deforestation and Climate Change. Amazon Institute for Environmental Research (www.edf.org/documents/4930_TropicalDeforestation_and_ClimateChange.pdf)

UNFCCC. 2006. Background Paper for the Workshop on Reducing Emissions from Deforestation in Developing Countries. (http://unfccc.int/methods_and_science/lulucf/items/3757.php)

Chapter 2.1 REDD Basics

Myers, E. 2008. Climate Change and Forestry: A REDD Primer. *The Katoomba Group's Ecosystem Marketplace.* (http://ecosystemmarketplace.com/pages/article.news.php?component_id=5797&component_version_id=8713&language_id=12)

Chapter 2.2 Technical Elements of REDD

Pearson, T. S. Walker, and S. Brown. 2005. Sourcebook for Land Use, Land Use Change and Forestry. *Winrock International*. (http://www.winrock.org/ecosystems/files/Winrock-BioCarbon_Fund_Sourcebook-compressed.pdf)

IPCC. 2000. Special Report on Land Use, Land-Use Change, and Forestry. (http://www.ipcc.ch/ipccreports/sres/land_use/index.htm)

!PCC. 2003. Good Practice Guidance for Land Use, Land Use Change, and Forestry. (http://www.ipcc-nggip.iges.or.jp/public/gpglulucf/gpglulucf.html)

Myers, E. 2007. Policies to Reduce Emissions from Deforestation and Degradation (REDD) in Tropical Forests. *Resources for the Future*. (http://www.rff.org/RFF/Documents/RFF-Rpt-REDD_final.2.20.09.pdf)

Chapter 2.3 REDD Policy Context

Angelsen, A. 2008. Moving Ahead with REDD: Issues, Options and Implications. *Center for International Forestry Research.*

Brazilian Perspective on Reducing Emissions from Deforestation. Submission to the UNFCCC SBSTA. 2006.

Climate Change: Financing Global Forests. 2008. Eliasch Review. (http://www.occ.gov.uk/activities/eliasch/Full_report_eliasch_review(1).pdf)

Dutschke, M. and R. Wolf. 2007. Reducing Emissions from Deforestation in Developing Countries: The Way Forward. *GTZ*

Environmental Defense and the Instituto de Pesquisa Ambiental da Amazonia. 2007. Reducing Emissions from Deforestation in Developing Countries: Policy Approaches to

Stimulate Action. *Submission to the XXVI Session of the Subsidiary Body on Scientific and Technological Advice of the UNFCCC.*

Joanneum Research, Union of Concerned Scientists, Woods Hole Research Center, and the Instituto de Pesquisa Ambiental da Amazonia. 2006. Reducing Emissions from Deforestation in Developing Countries: potential policy approaches and positive incentives.

Hare, B. and K Macey. 2007. Tropical Deforestation Emission Reduction Mechanism. Greenpeace.

Mollicone, D., F. Achard, S. Federici, H. Eva, G. Grassi, A. Belward, F. Raes, G. Seufert, G. Matteucci, and E. Schulze. Avoiding deforestation: An incentive accounting mechanism for avoided conversion of intact and non-intact forests.

Myers, E. 2007. Policies to Reduce Emissions from Deforestation and Degradation (REDD) in Tropical Forests. Resources for the Future. (http://www.rff.org/RFF/Documents/RFF-Rpt-REDD_final.2.20.09.pdf)

Oganowski, M. N. Helme, D. Movius, and J. Schmidt. REDD: The Dual Markets Approach. Center for Clean Air Policy

Parker, C. and A. Mitchell. 2008. The Little REDD BooK. The Global Canopy Programme. (www.globalcanopy.org).

Prior, S., R. O'Sullivan, and C. Streck. 2007. A Carbon Stock Approach to Creating a Positive Incentive to Reduce Emissions from Deforestation and Forest Degradation.

Reducing Emissions from Deforestation in Developing Countries: Approaches to Stimulate Action. Submission of Views to the UNFCCC COP 11 by Bolivia, Central African Republic, Costa Rica, Democratic Republic of the Congo, Dominican Republic, Fiji, Ghana, Guatemala, Honduras, Kenya, Madagascar, Nicaragua, Panama, Papua New Guinea, Samoa, Solomon Islands, and Vanuatu

Strassburg, B., R.K. Turner, B. Fisher, R. Schaeffer. An Empirically-Derived Mechanism of Combined Incentives to Reduce Emissions from Deforestation. CSERGE Working Paper ECM 08-01

The Terrestrial Carbon Group. 2008. How to Include Terrestrial Carbon in Developing Nations in the Overall Climate Change Solution

UNFCCC. 2007. Uniting on Climate: A Guide to the Climate Change Convention and the Kyoto Protocol.

Woods Hole Research Center and IPAM. 2008. How to Distribute REDD Funds Across Countries? A Stock-Flow Approach.

Chapter 2.4 Introduction to Carbon Markets

Butzengeiger, S. 2005. Voluntary Compensation of GHG Emissions: Selection Criteria for Offset Projects. *HWWI*

Capoor, K. and P. Ambrosi. 2008. State and Trends of the Carbon Market 2008. The World Bank. (http://go.worldbank.org/Z81OEW0D70)

Hamilton, K. M. Sjardin, T. Marcello, and G. Xu. 2008. Forging a Frontier: State of the Voluntary Carbon Markets 2008. New Carbon Finance. (http://www.ecosystemmarketplace.com/documents/cms_documents/2008_StateofVoluntaryCarbonMarket2.pdf)

Taiyab, N. 2006. Exploring the Market for Voluntary Carbon Offsets. *International Institute for Environment and Development.* (http://www.iied.org/pubs/display.php?o=15502IIED)

Chapter 2.5 Social Considerations

Accra Caucus on Forests and Climate Change. Principles and Processes as Preconditions for REDD. 2008. (http://www.recoftc.org/site/fileadmin/docs/Events/Features/ACCRA_Caucus__REDD_Principles_FINAL.pdf)

Griffiths T. 2007. Seeing 'RED'? Avoided Deforestation and the Rights of Indigenous Peoples and Local Communities. *Forest Peoples Programme.*

Luttrell, C. K. Schreckenberg, and L. Peskett. 2007. The implications of carbon financing for pro-poor community forestry. *Overseas Development Institute.* (http://www.odi.org.uk/fecc/resources/briefing-papers/fb14-0712-communityforestry.pdf)

Peskett, L., D. Brown, and C. Luttrell. 2006. Can Payments for Avoided Deforestation to Tackle Climate Change Also Benefit the Poor? *Overseas Development Institute.* (http://www.odi.org.uk/fecc/resources/briefing-papers/0611_avoideddeforestation.pdf)

Peskett, L., D. Brown, and C. Luttrell. 2006. Making voluntary carbon markets work better for the poor: the case of forestry offsets*. Overseas Development Institute.* (http://www.odi.org.uk/resources/specialist/forestry-briefings/11-voluntary-carbon-markets-poor-forestry-offsets.pdf)

Peskett, L., D. Huberman, E. Bowen-Jones, G. Edwards, and J. Brown. 2008. Making REDD Work for the Poor. *A Poverty and Environment Partnership Report*. (www.**povertyenvironment**.net/pep/?q=fi**le**stor**e**2/**d**own**l**oa**d**/1852/**Making**-**REDD**-**work-for-the-poor**-FU**LL**-050608.p**d**f*)*

REDD and the Rights of Indigenous and Traditional People: Manaus Declaration. Available through the Environmental Defense Fund:
http://www.edf.org/documents/8253_ManausDeclaration.pdf

United Nations Food and Agriculture Organization (FAO) Facts and Figures.
(http://www.fao.org/forestry/28811/en/)

Chapter 2.6 Biodiversity and Ecosystem Services Considerations

Millennium Ecosystem Assessment *Biodiversity Synthesis*. Report can be downloaded from Millennium Ecosystem Assessment Synthesis Report page

Food and Agriculture Organization of the U.N.: The State of the World's Forests 2003

United Nations Environment Program World Conservation Monitoring Centre. 2008. Carbon and Biodiversity A Demonstration Atlas.

Miles, L. and V. Kapos. 2008. *Reducing Greenhouse Gas Emissions from Deforestation and Forest Degradation: Global Land Use Implications.* Science 320

Reducing Emissions from Deforestation: A Key Opportunity for Attaining Multiple Benefits (published by UNEP and World Conservation Monitoring Centre (WCWM)). Authors: V. Kapos, P. Herkenrath, and L. Miles; Year: 2007 Download report from:
http://www.unep-wcmc.org/climate/forest.aspx

Reducing Emissions from Deforestation: global mechanisms, conservation, and livelihoods. A second very useful paper published by UNEP and World Conservation Monitoring Centre -
http://www.unep-wcmc.org/climate/forest.aspx
Seeing REDD: Reducing Emissions and Conserving Biodiversity by Avoiding Deforestation

Potential Synergies between Existing Multilateral Environmental Agreements in the Implementation of LULUCF Activities. A. Cowie, U. Schneider, and L. Montanarella; Year : 2007

Chapter 3.2 National Level REDD Programs

Forest Carbon Partnership Facility. 2008. Information Memorandum.
(http://wbcarbonfinance.org/docs/FCPF_Info_Memo_06-13-08.pdf)

Reducing Emissions from Deforestation and Forest Degradation in Indonesia (REDDI). 2007. Indonesia Forest Climate Alliance.
(http://www.dephut.go.id/INFORMASI/LITBANG/IFCA/Summary%204%20policy%20makers_final.pdf)

Chapter 4.1 Standards for REDD Projects

Climate, Community, and Biodiversity Standards: www.climate-standards.org

Voluntary Carbon Standard: http://www.v-c-s.org/

ANNEX 3 :
Additional Reference Material

REDD is a quickly evolving field and new information is published all the time on various aspects of REDD. Useful sites for accessing the most up-to-date information on REDD include:

- ConserveOnline: http://conserveonline.org/workspaces/redd.
- The Katoomba Group's Ecosystem Marketplace Forest Carbon Portal: http://www.forestcarbonportal.com/
- The UNFCCC REDD Web Platform: http://unfccc.int/methods_science/redd/items/4531.php

The Nature Conservancy
Worldwide Office
Climate Change Team
4245 North Fairfax Drive
Arlington, VA 22203
nature.org