REDD

**Introductory Course on Reducing Emissions from Deforestation and Forest Degradation and the role of conservation, sustainable management of forests, and enhancement of forest carbon stocks (REDD+)**

# A Participant Resource Manual

April 2009
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**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

# 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.


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# 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 and the role of conservation, sustainable management of forests, and enhancement of forest carbon stocks (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.

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## ACRONYMS

| | |
|---|---|
| AAU | Assigned Amount Unit |
| AFOLU | Agriculture, Forestry, and other Land Uses |
| CBA | 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 |
| REDD+ | REDD plus also includes enhancement of forest carbon stocks, sustainable management of forests and conservation |
| 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 Emissions from Deforestation and forest Degradation and the role of conservation, sustainable management of forests, and enhancement of forest carbon stocks **(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, which mentions other land use measures, and was formally expanded to "REDD-plus" at subsequent meetings before being included in the Copenhagen Accord in 2009 (FCC/CP/2009/L.7).

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 initiated its Forest Carbon Partnership Facility in June 2008; 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 mid-2008, updated in April, 2010, 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 and is freely available to the public at www.conservationtraining.org. This on-line resource features an interactive, self-guided training course on REDD+ divided into various information modules.

## 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 instructor's manual 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+**. This section explores the contextual issues that have allowed REDD+ to become such an important forest conservation mechanism. Specific topics include:

- Introduction to climate change
- The role of forests in climate change
- Drivers of deforestation
- Strategies to reduce deforestation and forest degradation and enhance carbon stocks

**Section 2: REDD+ Basics**: This section provides basic information about REDD+. Specific topics include:

- Introduction to REDD+
- Technical Elements of REDD+
- Social Considerations
- Biodiversity and Ecosystem Services

**Section 3**: International Context: International negotiations currently underway are shaping and will continue to shape national and sub-national/project level REDD+ activities. Understanding how these debates and frameworks will impact on national and sub-national/project level REDD+ activities is important. Specific topics include:

- International REDD+ policy context
- Outstanding policy questions
- REDD+ Financing

**Section 3**: National and Nested 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:

- National level REDD+ program basics
- 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 life-cycle
- Standards and verification of REDD+ Projects
- REDD+ project case study

**Annexes**: Glossary, references and useful links are provided.

Feedback from participants on areas for improvement is 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

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 as temperature or precipitation) lasting for an extended period of time (typically decades).

**United Nations Framework Convention on Climate Change (UNFCCC) defines climate change as:**

"a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere"

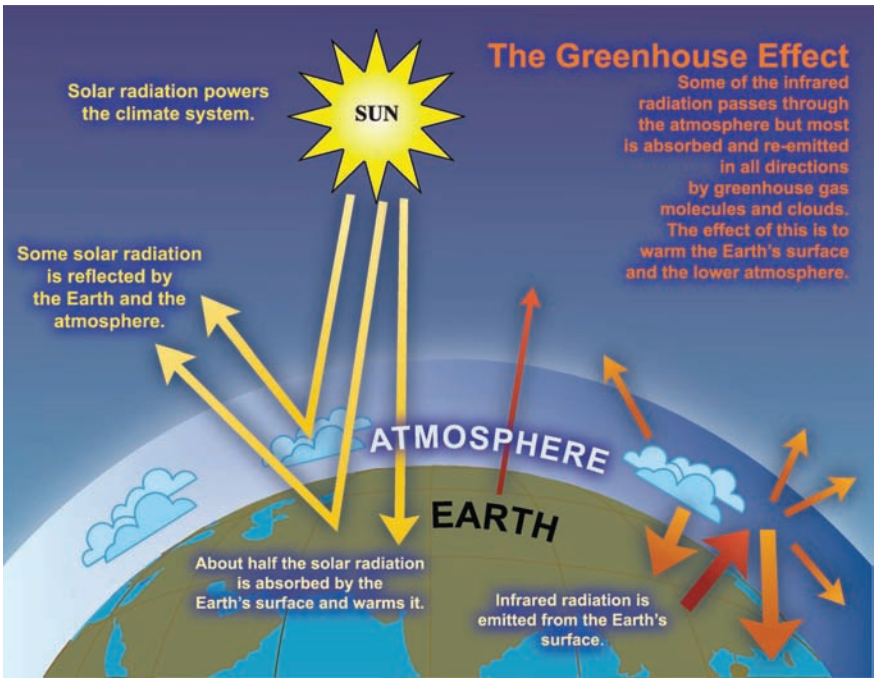
### The Greenhouse Effect

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 (CO2), methane (CH4), nitrous oxide (N2O) and haloflourocarbons (HFCs). These gases trap some of the infrared radiation and re-radiate it back to the Earth's surface, 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 (95ºF) 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), 2007, 4th Assessment Synthesis Report, p.30
[2] IPCC 4th, 2007, Assessment Synthesis Report, 3.2 p. 35

**Figure 1**: The Greenhouse Effect




Source: 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., Qin, D., Manning, M., Chen, Z., Marquis, M., Averyt, K.B., Tignor, M. and Miller, H.L. (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA URL: http://www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4-wg1-faqs.pdf

## 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 (CO2).

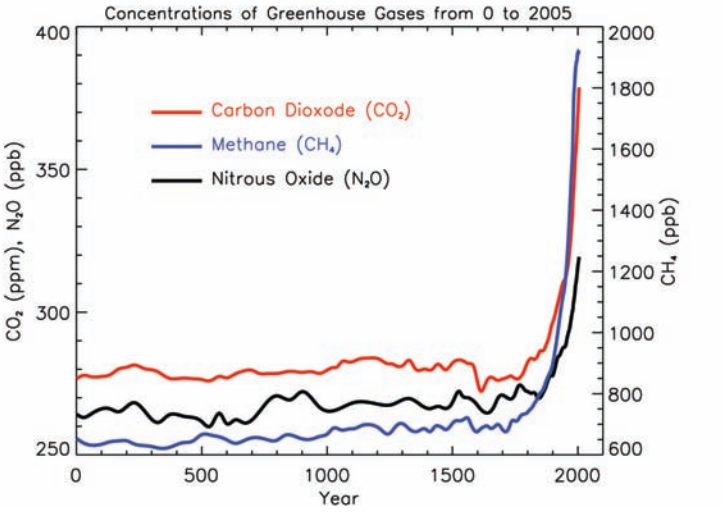
Carbon dioxide is the greenhouse gas that is most often mentioned in the context of climate change. This attention is due to the fact that CO2 is the most prevalent greenhouse gas released by human activity and 75% of the increase in atmospheric CO2 concen¬tration since pre-industrial times is due to fossil fuel combustion, with the largest contribution from energy, industry and cement manufacture.[3] In 2004, for example, almost 50 billion tons of greenhouse gases were released, of which about 77% was CO2. 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.[4]

Because CO2 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 CO2 and it absorbs 296 times more infrared radiation than CO2.

[3] 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, Qin, S., D., Manning, M., Chen, Z., Marquis, M., Averyt, K.B., Tignor, M. and Miller, H.L. (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA

[4] IPCC, 2007, 4th Assessment Working Group III Report, p.103

**Figure 2**: Atmospheric concentrations of important long-lived greenhouse gases over the last 2,000 years with increases since 1750 attributed to human activities in the industrial era.




Source: 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., Qin, D., Manning, M., Chen, Z., Marquis, M., Averyt, K.B., Tignor, M. and Miller, H.L. (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA

**Conversions**:

Tons of Carbon Dioxide Equivalents (tCO2e): 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 CH4 has the equivalent effect of 23 tons of CO2.
- 1 ton or N2O has the equivalent effect of 296 tons of CO2

**Table 1**: Greenhouse Gases and Global Warming Potential

Source: IPCC, 2007, 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)

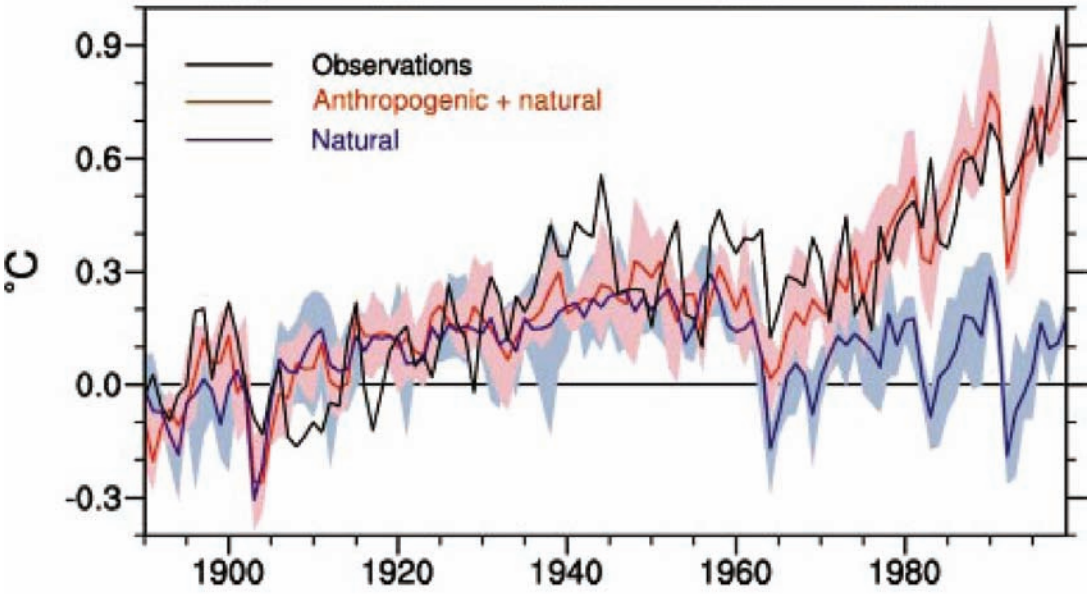
| Greenhouse Gas | Formula/ Abbreviation | Atmospheric Lifetime (years) | Global Warming Potential ($CO_2$ equivalent) |
|---|---|---|---|
| Carbon dioxide | $CO_2$ | Approximately 100 years | 1 |
| Methane | $CH_4$ | 12 | 23 |
| Nitrous oxide | $N_2O$ | 114 | 296 |
| Chlorofluorocarbons | CFC-11 | 45 | 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 |

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 and methane, in the atmosphere.[5] Concentrations of these GHGs in the atmosphere are very likely at their highest level in more than 650,000 years, outweighing all other factors that contribute to climate change.[6] Carbon dioxide, in particular, is rising quickly, reaching 388 parts per million (ppm; the volume of CO2 molecules relative to molecules of other gasses) in 2010, up from 377 ppm in 2005 and 300 ppm in 1900.[7] While natural processes can release these gases to the atmosphere, analyses reveal that the added CO2 bears 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, volcanic activity, and other natural factors appear to account for less than 10% of observed changes in global temperatures.[8]

**Figure 3**: Comparison of Modeled and Observed Temperature (1890 to 2000)




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

[5] IPCC, 2007, 4th Assessment Synthesis Report , p.36
[6] Ibid, p.37
[7] Tans, P., NOAA/ESRL (www.esrl.noaa.gov/gmd/ccgg/trends)
[8] IPCC, 2007, 4th Assessment Working Group I Summary for Policymakers, p.10

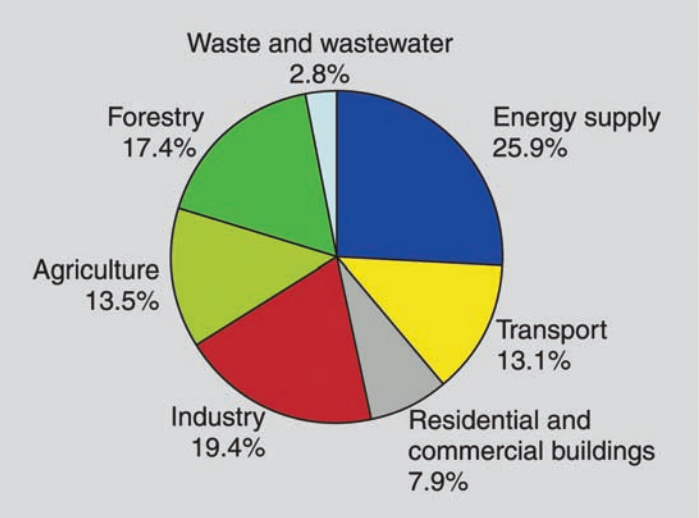
Warming of the climate system is now unequivocal and it is very likely that human activities are driving the current rate of climatic change.[9] When people burn fossil fuels to heat their homes or fuel their cars, and when land is converted from forests to other uses, greenhouse gases are emitted to the atmosphere. 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<br>Rice paddies<br>Livestock production |
| Nitrous oxide (N2O) | Fossil fuel combustion<br>Nitric acid production | Fertilizer use<br>Burning of biomass |
| Hydrofluorocarbons (HFCs) | Industrial processes<br>Manufacturing | --- |
| Perfluorocarbons (PFCs) | Industrial processes<br>Manufacturing | --- |
| Sulphur hexafluoride (SF6) | Electrical transmission and distribution systems | ---- |

The figure below illustrates the main sources of greenhouse gas emissions from human activities.

**Figure 4**: Sources of GHG emissions




Source: IPCC, 2007, 4th Assessment Synthesis Report Summary for Policymakers, p.5.

[9] IPCC, 2007, 4th Assessment Synthesis Report, p.37, 39

## 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 Intergovernmental Panel on Climate Change (IPCC)[10], in the 20th century:

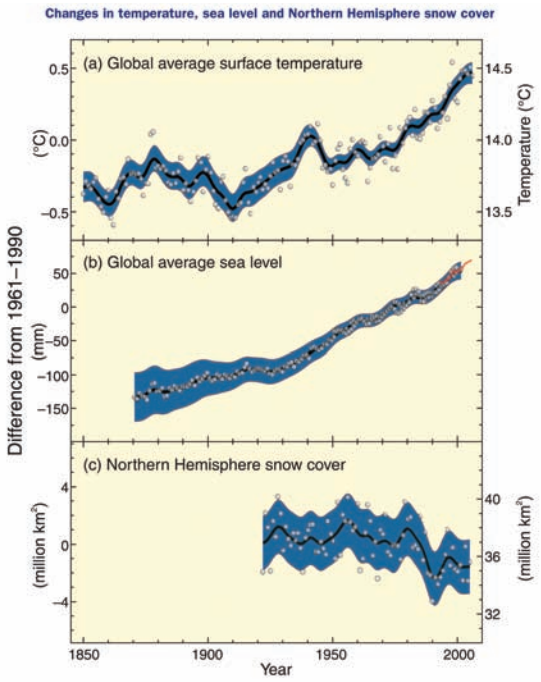
- Global temperatures increased by 0.7ºC (1.3 ºF);
- Sea level rose 17 cm (7 inches);
- Northern Hemisphere snow cover declined 7%;
- Melting of glaciers and ice sheets around the world has accelerated;
- More droughts and other extreme weather events are occurring;
- Warmer ocean surface waters are 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;
- 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.

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). 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 compared to pre-industrial levels.[11]

[10] IPCC, 2007, 4th Assessment Working Group II

[11] IPCC, 2007, 4th Assessment Working Group II, p. 10

**Figure 5**: Observed Changes in Surface Temperature, Sea Level and Snow Cover (1850-2000)

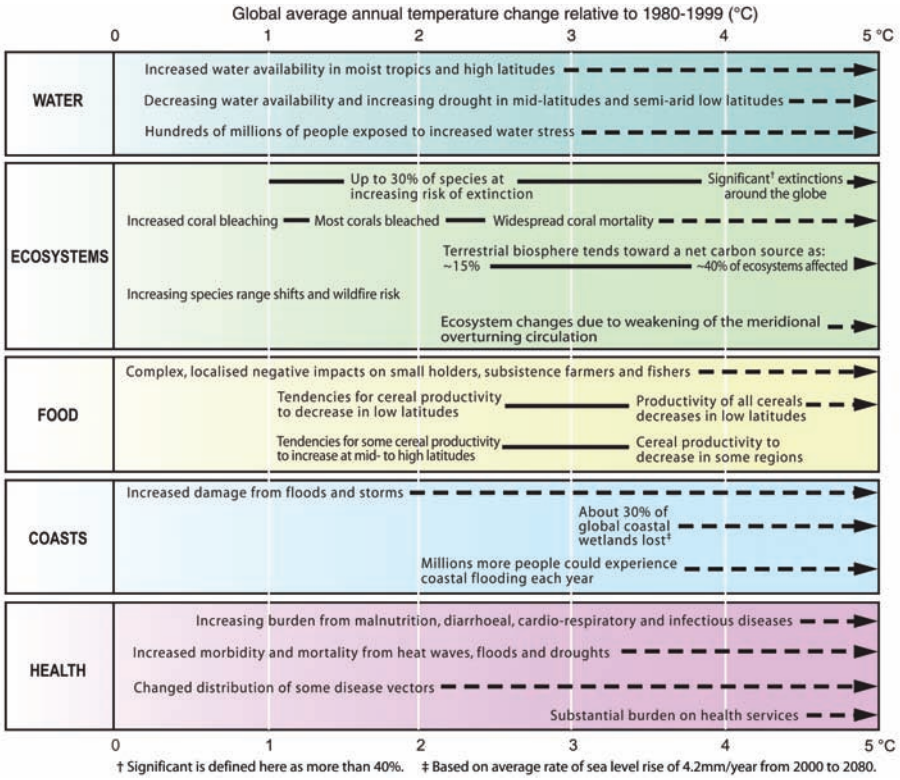



Observed changes in (a) global average surface temperature; (b) global average sea level from tide gauge (blue) and satellite (red) data and (c) Northern Hemisphere snow cover for March-April. All differences are relative to corresponding averages for the period 1961- 1990. Smoothed curves represent 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, 2007, 4th Assessment Working Group II Synthesis Report, p. 3

As temperature increases move closer to 2ºC, the impacts are increasingly serious: up to 30% of species with an increased risk of extinction and most corals are bleached.[12] 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. These are illustrated in the figure below.

**Figure 6**: Projected impacts of climate change




Source: IPCC, 2007, Working Group II Synthesis Report, p. 10

[12] IPCC, 2007, 4th Assessment Working Group II, p. 10

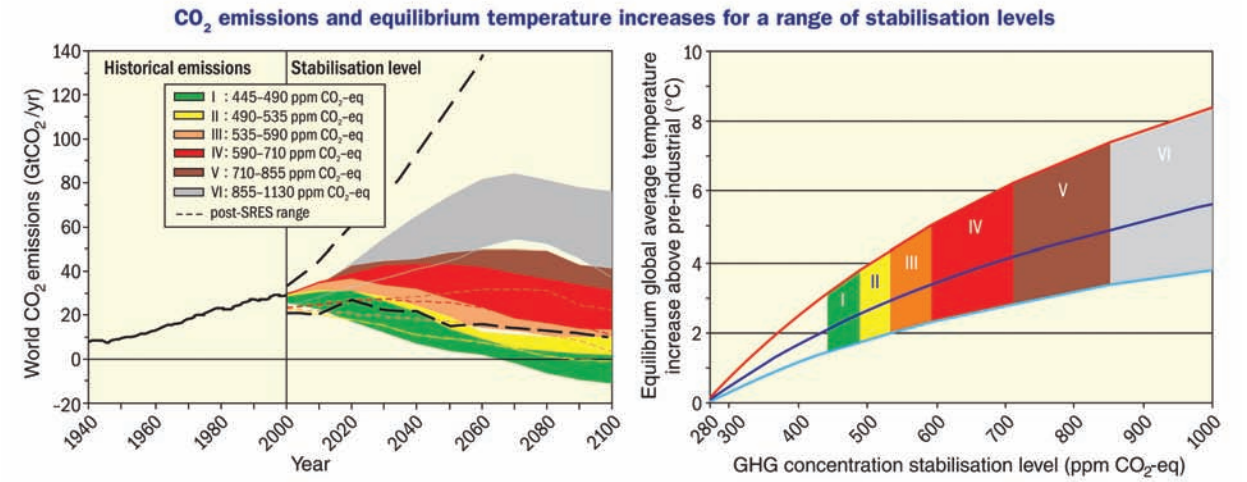
## Climate change solutions

In order to avoid the most serious impacts of climate change, humans will have to significantly reduce the amount of greenhouse gas emissions released into the atmosphere. There are various ways to make these reductions, including increasing automobile efficiency, increasing access to and use of public transportation, 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 Figure 6, there has been a general convergence in many 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 CO2. 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 compared to pre-industrial levels, we must stabilize global atmospheric concentrations of greenhouse gases at, or below, 450 parts per million (ppm) carbon dioxide equivalent (CO2e). Even stabilizing at 450ppm does not guarantee that warming will be kept under 2ºC (see Figure 7). 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 7**: Stabilization scenarios




Source: IPCC, 2007, 4th Assessment Synthesis Report, p.66

In addition to IPCC estimates, other research indicates that even deeper reductions may be needed. A recent scientific paper by Hansen et al[13] indicates that stabilizing atmospheric concentrations of CO2 at 350ppm provides the best chance of limiting warming to 2 ºC. Atmospheric concentrations of CO2 are currently at 385ppm, which means that, to meet that target, humanity would need to reduce our

emissions to the extent that atmospheric concentrations of GHGs 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.

[13] Hansen, J., et al., 2008, Target Atmospheric CO2: Where should humanity aim?, Open Atmospheric Science Journal, 2, p.217-231

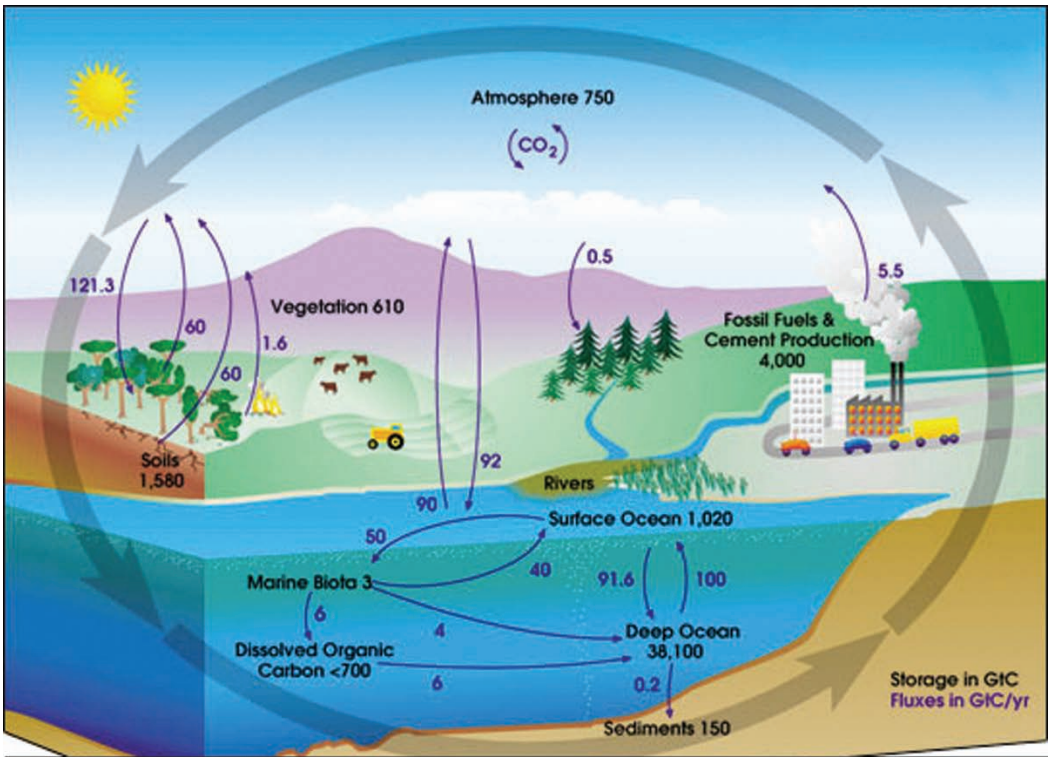
## 1.2. THE ROLE OF FORESTS IN CLIMATE CHANGE

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. In fact, the terrestrial carbon sink, which includes soils, trees and other vegetation, soaks up as much as half of all humans' GHG emissions from fossil fuels each year, significantly slowing the buildup of climate-warming gases in our atmosphere.[14]

### Forests in the Global Carbon Cycle

Half of all organic matter, such as trees and grasses, is composed of carbon. Just as burning fossil fuels produces greenhouse gases, burning organic matter such as 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 8**: The Global Carbon Cycle




[14] Woods Hole Research Center, 2007, The Missing Carbon Sink. http://www.whrc.org/carbon/missingc.htm; IPCC, 2007a, 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., Qin, D., Manning, M., Chen, Z., Marquis, M., Tignor, K.B.M., and Miller, H.L. (eds.)], Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 996 p.

Forests therefore play an important role in the global carbon cycle (see Figure 8). In 2005, global forests covered 4 billion hectares, or 30% of the total land area worldwide. The world's forests stored 283 gigatons (Gt = a billion tons) 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 six commonly considered 'pools' as described in Table 3.

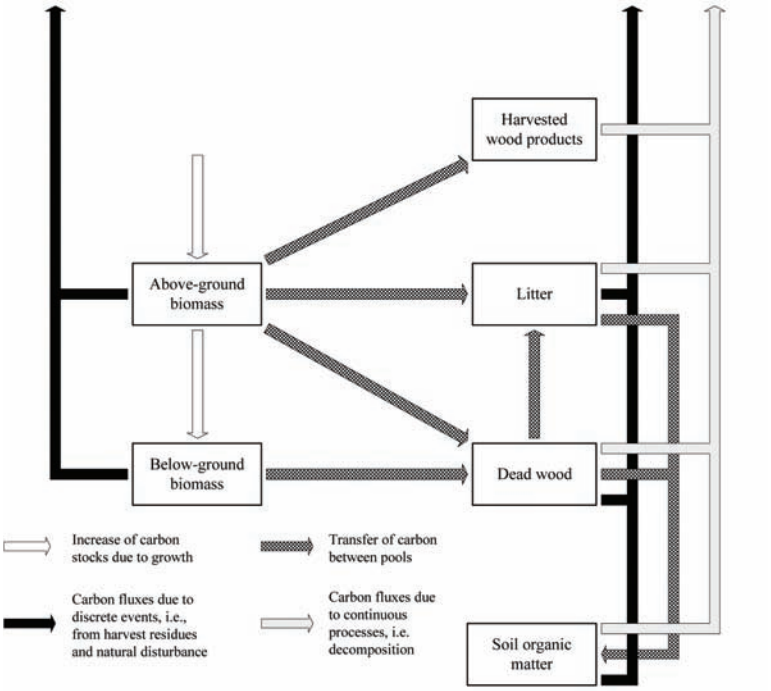
**Table 3:** Forest Ecosystem Carbon Pool

| **Carbon Pool** | **Description** | **Percentage Carbon Storage in Total Ecosystem** |
|---|---|---|
| *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)[1], 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 9. As you can see in the following 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.

[15] United Nations Food and Agriculture Organization (FAO), 2005, Global Forest Resources Assessment 2005, FAO Forestry Paper N.147.
[16] 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 9**: Generalized Carbon Cycle for Terrestrial Ecosystems




Source: IPCC, 2006, Guidelines for National Greenhouse Gas Inventories Vol. 4 AFOLU p 28

## 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.[17] Trees in tropical forests hold, on average, about 50% more carbon per hectare than trees outside the tropics.[18]

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 where more than 11 million hectares are destroyed each year.[19] 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.

## Carbon Emissions from Tropical Deforestation

Deforestation is the second largest anthropogenic source of carbon dioxide to the atmosphere after fossil fuel combustion. Deforestation and land-use activities emit about 4.32 GtCO2 (1.2 Pg C) per year,20 significantly reducing the role forests play as a net carbon sink.[21] In comparison, annual fossil fuel and

[17] Bonan, G. B., 2008, Forests and Climate Change: Forcings, Feedbacks, and the Climate Benefit of Forests. Science 320, p.1444 -1449
[18] Houghton, R.A., 2005, Tropical Deforestation as a Source of Greenhouse Gas Emissions, In: Tropical Deforestation and Climate Change. Amazon Institute for Environmental Research
[19] FAO, 2005, Global Forest Resources Assessment 2005' FAO Forestry Paper N.147; mongbay.com, Tropical deforestation tables. URL: http://rainforests.mongabay.com/deforestation_alpha.html
[20] van der Werf, G. R., Morton, D. C., DeFries, R. S., Olivier, J. G. J., Kasibhatla, P. S., Jackson, R. B., Collatz, G. J. and Randerson, J. T., 2009, CO2 emissions from forest loss, Nature Geoscience: 2
[21] Ibid.
[22] 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., Qin, D., Manning, M., Chen, Z., Marquis, M., Averyt, K.B., Tignor, M. and Miller, H.L. (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA

cement emissions are now more than 8.4 GtC annually (30.24GtCO2), up about 20% from 2000 levels.[22] This means that deforestation accounts for about 12%[23] of total GHG emissions from humans, more than the entire global transportation sector. When peatland emissions are included, this rises to about 15% of total anthropogenic CO2 emissions, a slight decline from previous IPCC estimates (17% and 23% including peat) as carbon emissions from fossil fuel combustion have increased substantially since the IPCC report was released. 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.

**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."

Despite this, deforestation represents a significant amount of greenhouse gas emissions that must be addressed if climate change is to be effectively mitigated. Forests and other terrestrial sinks annually absorb approximately 11.9 billion tons (gigatons, or Gt) of CO2 which is equivalent to 3.3 billion tons of C.[24] Protecting existing carbon-rich ecosystems, and restoring degraded lands, has enormous potential for low-cost mitigation.

## Forest Degradation

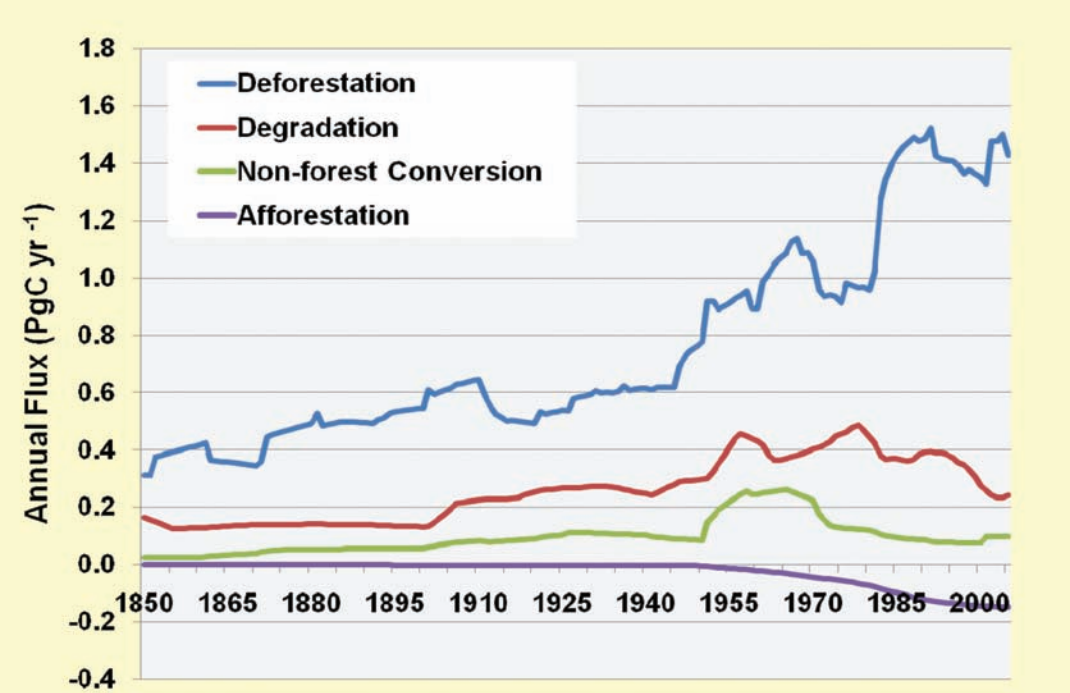
Deforestation is not the only means through which forests emit carbon. Deforestation is defined by the Intergovernmental Panel on Climate Change as the "permanent removal of forest cover and withdrawal of land from forest use, whether deliberately or circumstantially." The IPCC employs a minimum crown 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 is often an important precursor to deforestation. Globally, degradation accounts for at least 5% of forest emissions, according to the IPCC, although much higher figures have been reported in the literature. Recent studies estimate that "forest degradation from logging, fires, and fuelwood collection represents 20-57% of forest emissions."[25] Figure

[23] Range 6–17%
[24] 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., Qin, D., Manning, M., Chen, Z., Marquis, M., Averyt, K.B., Tignor, M. and Miller, H.L. (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA
[25] Griscom, B., Ganz, D., Virgilio, N., Price, F., Hayward, J., Cortez, R., Dodge, G., Hurd, J., Lowenstein, F. L., Stanley, B., 2009, The Hidden Frontier of Forest Degradation: A Review of the Science, Policy and Practice of Reducing Degradation Emissions. The Nature Conservancy, Arlington, VA

11 breaks down the emissions from forests into various types of conversion (assuming a lower percentage of degradation).

**Figure 11**: Deforestation and degradation emissions

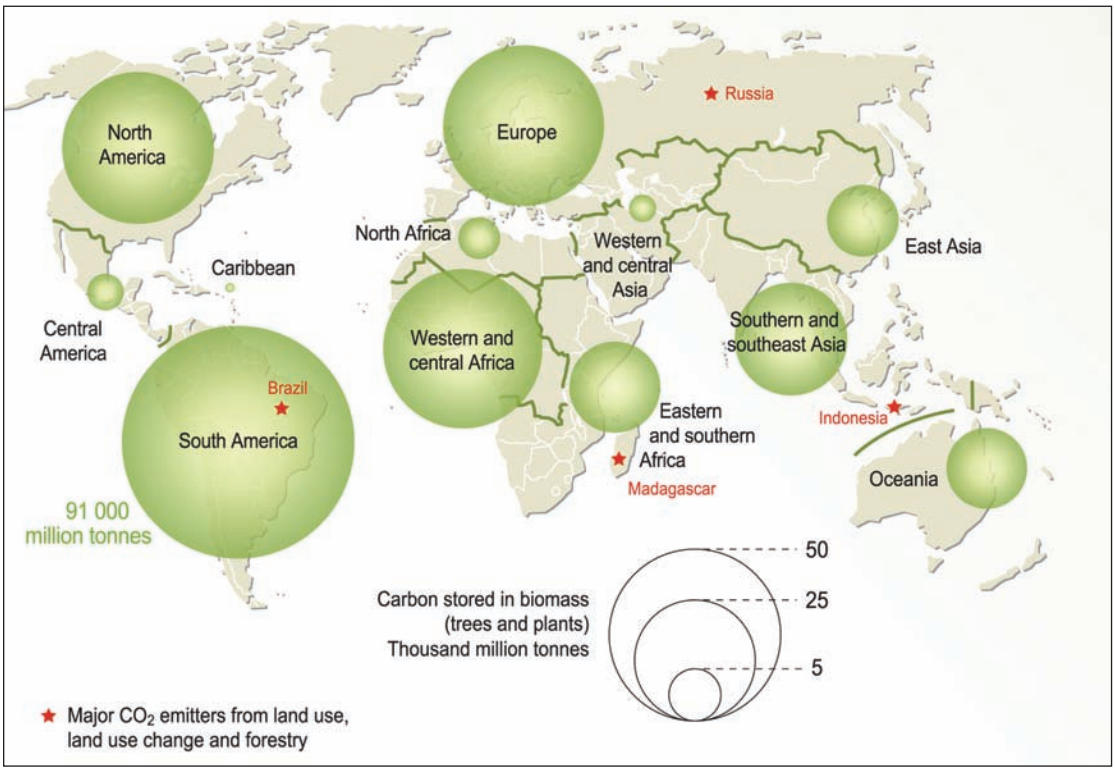



Source: Presentation by R.A Houghton at the WWF Fuller Symposium 2007

Deforestation and forest degradation are not evenly distributed around the world. For example, Indonesia and Brazil account for 61% of the world's emissions from Land Use Land Use Change and Forestry (LULUCF).[26] 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.

[26] WRI CAIT, data for 2005, URL: http://cait.wri.org

**Figure 12**: Carbon stocks in tropical forests




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

**Table 4**: 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: FAO; WRI's Climate Analysis Indicators Tool Database, 2005

## Afforestation and Reforestation (A/R)

Afforestation and reforestation activities convert land without significant tree cover into forested lands. Under the Clean Development Mechanism, afforestation is defined as "the direct human-induced conversion of land that has not been forested for a period of at least 50 years to forested land through planting, seeding and/or the human-induced promotion of natural seed sources" while reforestation is this same "conversion of non-forested land to forested land" for lands without forest on 31 December 1989.

Growing trees and vegetation removes carbon from the atmosphere and stores it in aboveground and belowground biomass, as much as 5-11 tons CO2 per hectare per year depending on location and productivity. There are many opportunities to sequester carbon by converting this agricultural land into forests, as deforestation represents only 40%–70% of the total potential carbon mitigation potential in the regions with major deforestation. Estimates of the sequestration potential for reforestation and afforestation over the years have ranged from 1 to 10 billion tons depending on the assumptions. A recent analysis by Sohngen and Mendelsohn (2003, 2007) suggest that 0.7 – 2.2 billion tons CO2 can be sequestered globally per year, with higher prices resulting in even more sequestration .

## 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 CO2 emissions as is shown in Table 5. Forestry activities are therefore very important tools for mitigating climate change.

**Table 5**: Forest GHG 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 |
| **Avoiding 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: Brown, S., 1999, Opportunities for mitigating carbon emissions through forestry activity, Winrock International

[27] For US$8-US$30 per ton CO2 based on a global land use model

## 1.3. DRIVERS OF DEFORESTATION AND DEGRADATION

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.[28]

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.[29] While gains can be unsettlingly small or impressively large, short-term or sustainable, there is one economic rationale that applies to all forest actors: landholders and land claimants will deforest when it offers higher returns than maintaining the land in forest.[30] 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.[31]

**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 per 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.[32] Only a few drivers of deforestation are universal, and these drivers and other factors interact differently among regions and even among cases.

There are two main categories of drivers of deforestation: proximate (direct) causes and underlying causes.

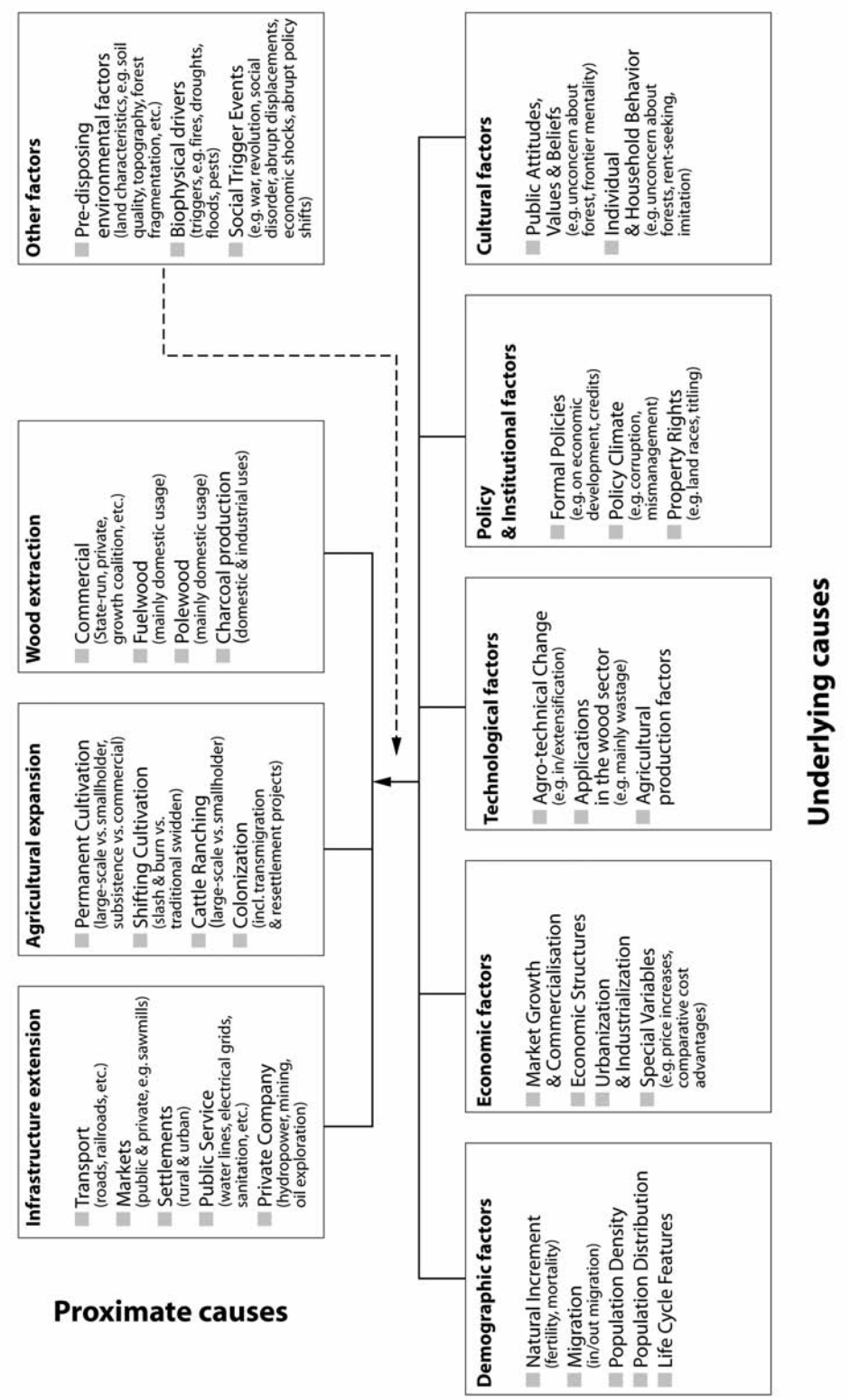
- Proximate causes are human activities that directly impact the environment at the local level.
- Underlying drivers are social, economic, political, and/or cultural processes that indirectly impact deforestation.

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 13). At the global scale, agricultural expansion was, by far, the leading land-use change associated with

[28] Chomitz, K., 2007, At Loggerheads? Agricultural Expansion, Poverty Reduction, and Environment in the Tropical Forests, The World Bank
[29] Ibid.
[30] Ibid.
[31] Ibid
[32] Geist, H. and E. Lambin, 2001, What Drives Tropical Deforestation? LUCC Report Series No. 4

nearly all deforestation cases studies, whether through forest conversion for permanent cropping, cattle ranching, shifting cultivation, or colonization agriculture.

**Figure 13**: 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:[33]

- Favorable environmental conditions
- High prices for agricultural outputs
- Low wages for laborers who clear the land
- Demographic changes

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.

### 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, foreign exchange rate policy, and trade policies governing sectors linked to deforestation and degradation may also have significant potential to impact land use changes.[34]

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

**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.

**Deforestation Economics**
Deforestation is driven by many inter-related and complex factors, but ultimately land use change is about economic 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 cannot 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 more economically attractive. 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.

For these reasons, rural road provision is a mainstay of rural development strategies, but with this brings pressure to deforest.

At the end of the day, the decision to deforest is influenced by market forces. As the market approaches (by road and infrastructure development, technological gains, higher farmgate returns), landholders (or would-be land claimers) balance returns from sustainable timber production against timber extraction, followed by agricultural conversion. Even low-return pastures or staple crops may offer higher returns to landholders who only have access to low-value, slow growing species (that may be biological diverse).

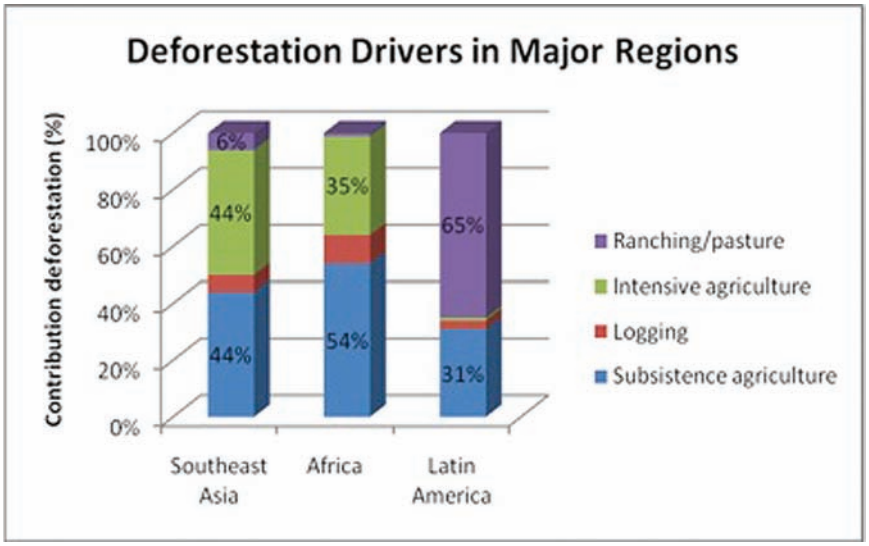
Of course society, with a demand for forest environmental services, may view things differently and may start paying for these services through such mechanisms as REDD+.

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

## Regional Differences

The causes of deforestation vary around the world, but regional trends result from similar underlying social, economic, and environmental pressures within a region. In Africa, population pressure and uncertain land tenure profoundly shape patterns of forest loss, while prices for agricultural commodities such as beef or palm oil spur forest conversion in Latin America and Southeast Asia. The direct causes in each region, and sometimes even among countries, can be quite different. In Africa, degradation and deforestation is associated with subsistence agriculture and over-harvesting of fuel wood by individuals for domestic uses. In Latin America, cattle ranching is the dominant cause of deforestation followed by subsistence agriculture which is exacerbated by road construction. In mainland and insular Asia, subsistence and intensive agriculture are the dominant drivers of deforestation.

**Figure 14**: Deforestation drivers




Source: Project Catalyst data analyzed by Rhett Butler; mongabay.com, 2009

**Table 6:** Deforestation drivers

| | Subsistence agriculture | Intensive agriculture | Ranching/pasture | Logging |
|---|---|---|---|---|
| **Southeast Asia** | 44% | 44% | 6% | 6% |
| **Africa** | 54% | 35% | 1% | 10% |
| **Latin America** | 31% | 1% | 65% | 3% |

Source: Project Catalyst data analyzed by Rhett Butler; mongabay.com, 2009

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 there is conflict or insecurity around the control of land.
- **Areas beyond the agricultural frontier**—where there is a lot of forest, few but largely indigenous inhabitants, and some pressure on timber resources.

This is represented in the table below which illustrates different deforestation rates according to forest type.

**Figure 15**: Rates of deforestation in different forest types, by region

| | Tropical forests | | | Tropical savannas | |
|---|---|---|---|---|---|
| Domain | Africa | Asia | Latin America and the Caribbean | Africa | Latin America and the Caribbean |
| Mosaiclands | 11.1 | 16.8 | 20.2 | 11.8 | 18.4 |
| Forest edges | 4.7 | 9.9 | 4.3 | 9.2 | 8.5 |
| Forest cores | 2.7 | 4.4 | 0.6 | 9.6 | 0.8 |
| Total | 5.4 | 10.9 | 3.6 | 9.9 | 10.8 |

Source: Reproduced from Chomitz, 2007; Authors' calculations based on CIESIN and others 2004a, b, c, ECJRC 2003, and FRA-RSS; see appendix B. Note: The table shows the percentage of forested 2- by 2-kilometer cells, by condition in 2000, that experienced a reduction in forest cover since 1990

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 for 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 and Degradation 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, governments and project developers should look at historical land-use patterns and identify where deforestation occurred in the area of interest and over which time. Maps of domestic deforestation drivers, such as: roads, sawmills, population centers, land-use zoning, and topography are useful tools in the analysis of how the various drivers 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 - in the analyses is essential to provide the local context and knowledge about the factors driving deforestation in a particular area.

## 1.4. STRATEGIES FOR REDUCING DEFORESTATION AND DEGRADATION AND ENHANCING CARBON STOCKS

When thinking about REDD+, it is important to remember that the same strategies that forest managers have employed for decades to reduce deforestation and promote reforestation can be used in a REDD+ framework. REDD+ is not an entirely new system of forest conservation, it is primarily a new way of financing that conservation. This section will review some forest conservation strategies 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 and enhance forest carbon stocks, they merely represent some examples.

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

- **Forest Protection**
- **Sustainable Forest Management**
- **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 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 substantially intact by restricting production and extractive use. This could both slow deforestation and restrict degradation which may represent at least 20 percent of total tropical forest emissions, nearly twice those referenced by the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC).[35]

In theory, strict forest protection is considered the most effective way to conserve forest carbon, biodiversity and other ecosystem services from forests. 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

[35] Griscom, B. et al. 2009. The Hidden Frontier of Forest Degradation: A Review of the Science, Policy and Practice of Reducing Degradation Emissions. The Nature Conservancy. Arlington, VA.

- *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 Forest Management

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 forest management can have significant carbon benefits, as well as community and biodiversity benefits.

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. Sustainable forest management is often also referred to as Improved Forest Management (IFM).

In simpler terms, the concept can be described as the attainment of a 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. To meet this vision of sustainable forest management, a shift of policies and practices in several sectors will be required, including in agriculture, timber, and alternative employment. Numerous methods of promoting sustainable forest management are already in use, including: community forest management, reduced impact logging, land swaps, agroforestry and alternative income generation. This section describes each in turn.

**Community Forest Management**

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 reduced deforestation, generated more sustainable income streams for communities and contributed to the acquisition of technical skills.

**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.

**Reduced Impact Logging**

Reduced impact logging (RIL) is an established set of timber harvesting practices designed to reduce the typical collateral damage resulting from timber extraction, in terms of (i) non-target trees damaged per unit volume of roundwood extracted and (ii) soil erosion and related hydrological impacts. RIL practices may also reduce the volume of timber extracted per unit area. Some RIL practices include:

- Additional training and incentive systems for logging and skidding (log removal) teams;
- Technical training on map production and interpretation;
- Cutting block layout and tree-marking prior to opening roads;
- Reduced skid trail/road density;
- Directional felling (cutting trees so that they fall away from standing trees to avoid damaging them);
- Cable winching of felled trees (extracting logs via cables attached to a tractor);
- Utilization of standards and procedures to optimize wood use by limiting felling damage and log waste (improved efficiency).

**Land Swaps**

Agricultural extensification onto non-forested land not currently being used for agriculture also offers potential for forest conservation. For example, estimates 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

**Case Study: Land Swaps on Oil Palm Plantations in Indonesia**

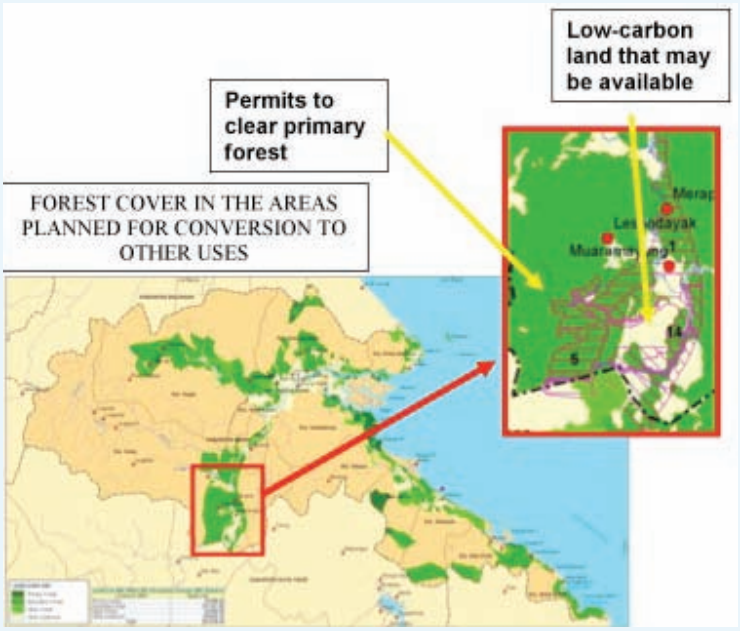
Logging, mining and the rapidly growing oil palm industry are killing off the forests of Indonesia faster than anywhere else on earth. The destruction of these forests produces 80 percent of Indonesia's carbon emissions, placing it among the world's top emitters of climate changing greenhouse gasses,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



**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.

**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 U.S. government and the government of a developing country in which:

- The United States 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.

**Payments for Ecosystem Services**
"Payments for ecosystem services", also called payments for environmental services (or PES) 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.

**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 US$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 US$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 of birds.
- 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.

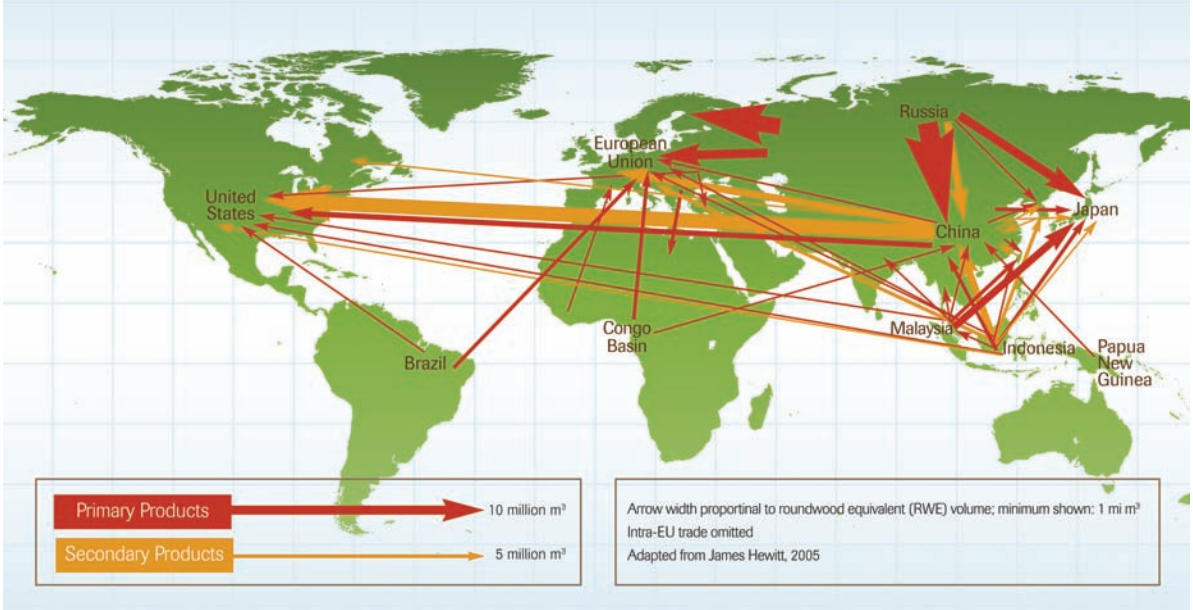
## Responsible Trade

The forest products industry, estimated at US$178 billion per year, is global and complex.[36] 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 16 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 16**: 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 a plant or plant product, including wood. Penalties range

[36] World Business Council for Sustainable Development, 2007, The Sustainable Forest Products Industry, Carbon and Climate Change: Key messages for policy-makers. URL: http://www.wbcsd.org/DocRoot/X1ZvkdDg4I9bOXKoXW8P/sfpi-carbon-climate.pdf

from US$250 to in excess of US$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 of raw materials from forest to the consumer, including processing, transformation, manufacturing and distribution. In the marketplace, certified wood and forest products may be labeled for businesses and consumers to choose products 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. Around the world, several hundred million acres of forest have been certified and nearly 60 forest certification systems are operating around the world, mostly at the country-level. Three elements are often associated with Forest Stewardship Council (FSC) certification: (1) reduced area logged, (2) reduced emissions within logged areas, and (3) reduced probability of subsequent forest conversion. This suggests FSC certification offers an opportunity to reduce forest carbon emissions with clear additionality since 99 percent of production forests in the tropics are not FSC certified, and 'improved forest management' broadly defined is practiced in only five percent of tropical production forests.[37]

[37] Griscom, B. et al. 2009. The Hidden Frontier of Forest Degradation: A Review of the Science, Policy and Practice of Reducing Degradation Emissions. The Nature Conservancy. Arlington, VA.

**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 was rigorous. In South Konawe District, forty-six villages created a cooperative called Koperasi Hutan Jaya Lestari (KHJL) with about two hundred farmers. 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

## REDD+ BASICS

**2.1. Introduction to REDD+**
**2.2. Technical Elements of REDD+**
**2.3. Social Considerations**
**2.4. Biodiversity and Other Ecosystem Services**

## 2.1. INTRODUCTION TO REDD+

The previous section of this manual provided basic information that is important to keep in mind when beginning to think about REDD+. Understanding the role forests play in the climate change, identifying the drivers of deforestation, and thinking through existing strategies for reducing deforestation and forest degradation and enhancing carbon stocks is critical to knowing how to move forward with REDD+. This section will now delve into the basics of REDD+. The following sections will then provide information on REDD+ related to the international context, national programs, and sub-national activities.

### What is REDD+?

REDD stands for Reducing Emissions from Deforestation and forest Degradation in developing countries. The "plus" in REDD+ stands for conservation, sustainable management of forests, and enhancement of forest carbon stocks. REDD+ is a mechanism that uses financial incentives to reduce the emission of greenhouse gases from deforestation and forest degradation and/or increases GHG removals in a measurable and verifiable way.

REDD+ incentives offer the opportunity to utilize funding from developed countries to reduce deforestation in developing countries. REDD+ puts a value on forests for the services they provide by keeping carbon out of the atmosphere. The ultimate goal of REDD+ is to make standing forests more valuable than the timber or agricultural revenues that would result from clearing forests and provide significant incentives to plant new trees.

REDD+ can refer to policies and measures—such as strategic road planning, implementing best practices for timber harvesting, restoring degraded forests, or restricting activities that degrade peatlands—that reduce emissions from deforestation and degradation across a landscape and/or increase removals of GHG emissions from the atmosphere. REDD+ can also refer to pilot projects or demonstration activities that have a clear objective to directly reduce emissions from deforestation and degradation or enhance forest carbon stocks in a specific geographic area.

Below we describe the basics of how each of the eligible REDD+ activities could function in a REDD+ framework.

**Reducing emissions from deforestation**

Deforestation broadly refers to the long-term or permanent conversion of forested land to non-forested land. Deforestation results in roughly 15% of annual greenhouse gas emissions, as described above. It is possible to calculate the annual rates of deforestation for each country, or for sub-national areas. By combining this information with data about the carbon density in the forests, an annual rate of emissions from deforestation can be defined. Various strategies can be employed to reduce this rate of emissions, as described in the previous section. The emission reductions achieved through the implementation of strategies to reduce deforestation can then be quantified. Through an international REDD+ mechanism, these quantified emissions reductions will have a value and countries and/or sub-national actors can receive compensation for them.

**Reducing emissions from forest degradation**

As defined above, forest degradation refers to the gradual thinning of a forest, without the full conversion to another land-use type. Similar to measuring deforestation emissions, annual emissions from degradation can be calculated using new methods for analyzing satellite data. Countries or sub-national actors can then implement activities to reduce emissions from degradation, such as reduced impact

logging, fire management, and fuelwood management. The carbon benefits of these activities can then be monetized as described for deforestation.

**Conservation**
Within current policy discussions on REDD+ conservation refers to the conservation of forests that have not historically, and are not currently, under threat. Since these forests are not facing deforestation or degradation, there is no way to reduce emissions from deforestation and degradation and earn compensation as described above. However, many of these forests may face increasing future threats and it is important to provide incentives to continue to conserve them. Therefore, a REDD+ policy framework will include some type of incentives to maintain non-threatened standing forests. These incentives may be the same or different from incentives for REDD.

**Sustainable Management of Forests**
Sustainable management of forests means that forest areas designated for the production of timber are managed in such a way as to effectively balance social, economic and ecological objectives. Production forests, under industrial-scale concessions or community control, typically represent an important part of nation's forest estate, often eclipsing the amount of land designated to official protection. Therefore, improving the management of those forests offers a significant opportunity to reduce emissions. In order to include sustainable management of forests within a REDD+ program, countries or sub-national actors would need to calculate emissions from existing forest management practices. Those actors can then implement activities to reduce emissions, while continuing to harvest timber. Such strategies may include reduced impact logging, reduction in harvest levels, and increased protection of high-value areas such as riparian zones.

**Enhancement of Forest Carbon Stocks**
Enhancement of forest carbon stocks has not yet been fully defined within the international negotiations on REDD+. However, it will likely include forest restoration, afforestation, and/or reforestation. Forest restoration is the process of assisting the recovery of the carbon stocks of an existing forest that has been degraded or damaged. Afforestation is the process of planting trees on land that has not been forested within the last 50 years (or has never been forested). Reforestation is the process of planting trees on land that was previously forested but has recently (within the last 50 years) been converted to other uses. Under a REDD+ framework, a country or sub-national actor could plant trees and/or restore a degraded forest and receive incentives from the international system. The implementer would likely be required to prove that there area would not otherwise have been reforested or would not have recovered on its own.

**Other Activities**
REDD+ does not currently include activities to reduce emissions on non-forested land such as agricultural land or non-forested wetlands. Such activities may be included in the future if REDD+ shifts toward a more comprehensive approach.

## REDD+ Phases

There is now broad consensus around the concept of implementing REDD+ in phases. Specifically, three phases for REDD+ have been identified:[38]

- Phase 1: REDD+ strategy development, including national dialogues and institutional strengthening;
- Phase 2: Implementation of polices and measures identified in national strategies;
- Phase 3: Payment for performance on the basis of quantified forest emission reductions and removals against agreed reference levels.

[38] Meridian Institute Options Assessment Report.

The phases for REDD+ provide a conceptual model for countries to work through in order to lay the foundation for a successful program over the long-term. The focus of phase one is to get countries ready to participate in REDD+. During this phase, countries increase their measurement and monitoring capacity, develop reference levels, strengthen institutions and establish national strategies. During phase two, countries begin to implement policies and measures that will lead to emissions reductions. These policies and measures could include land tenure reform, forest law enforcement, and forest management planning. Phase three focuses on the activities that directly produce verified emissions reductions and/or increased removals. Each of these phases could be financed through different sources and based on different measures. Countries could begin at whichever phase they were eligible for and could move between phases at their own pace. Table 7 summarizes each phase.

**Table 7**: Summary of REDD+ Phases[39]

| Phase | Scope | International Financial Instrument |
|---|---|---|
| Phase 1 | National REDD strategy development, capacity building, institutional strengthening. Demonstration activities.<br><br>Strategy development elements include, *inter alia*, reference level and monitoring, reporting, and verification (MRV) assessments and participation of indigenous peoples and local communities (see Chapters 3, 4, and 5, respectively). | Volunary contributions.<br><br>Eligibility: Demonstrated cross-sectoral commitment to REDD strategy development within the national government.<br><br>Examples: Forest Carbon Partnership Facility of the World Bank (FCPF) and United Nations Collaborative Programme on Reducing Emissions from Deforestation and Forest Degradation in Developing Countries (UN-REDD) "readiness" funding. |
| Phase 2 | Implementation of National REDD Strategy PAMs.<br><br>Strategy implementation elements include, *inter alia,* reference level setting, improvement of MRV, and participation of indigenous peoples and local communities. | Global facility(unitary fund, or clearinghouse that records eligible bilateral and multilateral contributions relative to binding commitments).<br><br>Eligibility: Demonstrated cross-sectoral commitment to REDD strategy implementation within the national government. Continued access dependent upon performance, including proxy indicators of emission reductions and/or enhanced removals.<br><br>Example: Brazil's Amazon Fund. |
| Phase 3 | Quantified changes in GHG emissions and/or removals. | Transition from global facility to integration with compliance markets.<br><br>Eligibility: Compliance-grade MRV and emissions/removals accounting relative to agreed reference levels. |

## The Scale of REDD+

In order for REDD+ to be successful, incentives will need to reach the actors responsible for addressing the drivers of deforestation and for shifting land use to a more sustainable and low-carbon model. These actors span multiple scales, from international commodity buyers to national governments to sub-national governments to indigenous peoples and forest-dependent communities and individual landowners/users.

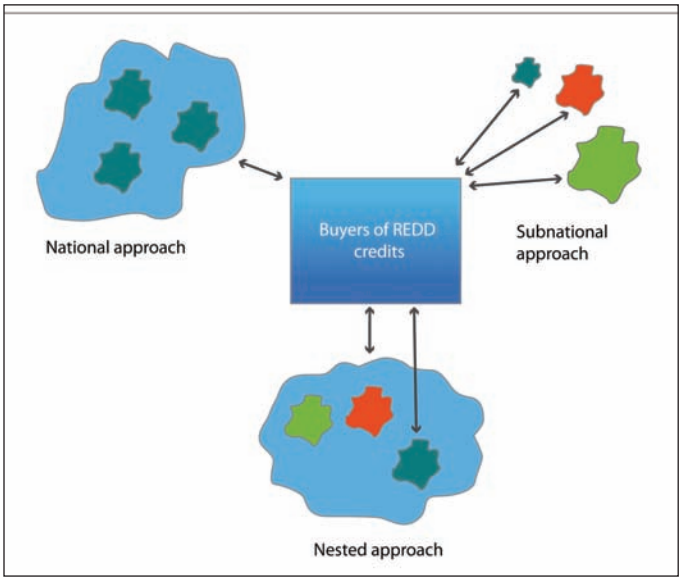
Successful implementation of REDD+ will require motivating all of these actors. There are three basic levels that incentives could flow: to national governments, to sub-national governments (such as states or provinces), or to local actors. Under a national approach to REDD+, incentives would only flow to

[39] Meridian Institute Options Assessment Report

national governments. Under a sub-national approach to REDD+, incentives would flow directly to sub-national governments and/or local project developers.

Nested or sequential approaches are also possible. Under a sequential approach, incentives could flow directly to sub-national actors for a certain time period. After that interim period, countries would be required to have set up a national accounting framework and incentives would only flow to the national governments. Under a nested approach, the national government would set up a national accounting framework and establish a nation-wide monitoring system. The national government could implement certain policy reforms that would lead to verifiable emission reductions and therefore earn incentives from an international system (or a bilateral arrangement). Meanwhile, implementation of REDD+ activities would also occur at the sub-national level led by local/regional governments, communities, NGOs, or private developers. These activities would account for emission reductions at the sub-national level and earn incentives directly from the international (or bilateral) system based on those reductions. The sub-national accounting would then need to be "trued-up" to the national level accounting and incentives would need to be correctly allocated to each actor. Figure 17 summarizes these options.

**Figure 17**: Possible scales of REDD+[40]




There are advantages and disadvantages to providing direct incentives to different scales. Yet to date, much of the focus of policy discussions on REDD+ has been on national governments in developing countries. While national governments have a critical role to play in the implementation of REDD+, other actors such as sub-national governments, indigenous peoples and communities, landowners/users, and investors also have a key role to play. In federal systems, sub-national governments (such as municipalities, states, districts, or provinces) may traditionally hold a great deal of power and may have the authority to make land-use decisions within their jurisdictions. Additionally, in many cases, communities and individual land users often have de facto control over land use even though they may not have legal land tenure. Much of the actual implementation of REDD+ activities can therefore be expected to take place at both sub-national level through direct interventions and at the national level through policies and measures. Sub-national actors will thus be likely to seek some ownership over the carbon rights within their jurisdictions and/or seek to ensure that they are fairly compensated by the national government for their success in reducing emissions or enhancing removals. Therefore, devising effective and transparent carbon accounting systems and incentive mechanisms that motivate both national and sub-national actors will be critical to successfully implementing REDD+.

[39] 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

## 2.2. TECHNICAL ELEMENTS OF REDD+

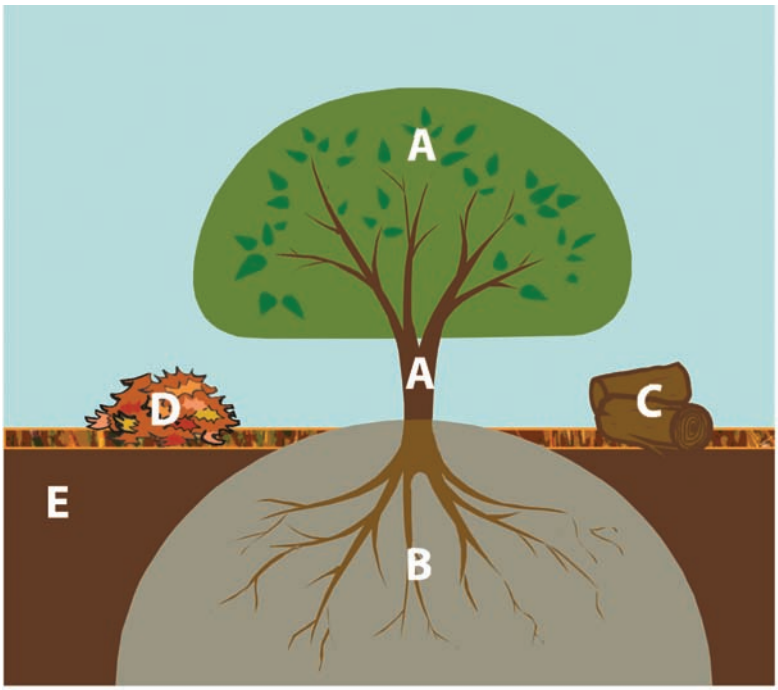
In this sub-section we will explore some important technical concepts that apply to REDD+ – measuring and monitoring, additionality, baselines, leakage, permanence, monitoring, and reporting and verification. These concepts are integral parts of a REDD+ approach and they are what makes REDD+ unique from 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 sub-section focuses on defining and describing the terms and concepts in a general manner. Some technical differences exist for REDD+ depending on whether it is implemented at the national-level or at a sub-national level. Those differences will be discussed in the later sections specific to those scales of implementation.

### Measuring and Monitoring

Measuring and monitoring are the processes by which the amount of carbon stored in forests ("carbon stocks"), as well as changes in these amounts, are calculated, using both satellite technology and field measurements. Measuring and monitoring fall under the larger category of "carbon accounting," which refers to the calculation of carbon benefits over time as a result of forest carbon activities. See Figure 18 for the five carbon pools that make up the total carbon stocks of a forest.

**Figure 18**: Five carbon pools that make up the carbon stock of a forest. Source: N. Virgilio, TNC




A. Aboveground Live Biomass (trunk, branches, leaves)
B. Belowground Live Biomass (roots)
C. Dead Wood (stumps, broken off branches, fallen trunks)
D. Litter (dead leaves and vegetation)
E. Soil (typically up to 30 cm depth)

While measuring and monitoring are perceived by some as a challenge to producing real, verifiable carbon credits due to the intensive and specialized processes involved, the methods used in carrying them out are time-tested and steeped in rigorous scientific theory. The basic steps involved in carbon accounting for REDD, IFM (SMF) and AR activities are illustrated in Figure 19. The steps differ somewhat; however, the need and methods to determine initial forest carbon stocks are consistent across all three types of forest carbon activities. The diagram illustrates a project approach, but the approach at the national level would likely entail similar steps.

**Area**
It is first necessary to determine the forest types present in the project area and/or country as a whole, as well as the extent of these forest types. This is generally accomplished using satellite imagery to delineate the forest types, cross-checked with on-the-ground observations. Delineation of forest type matters because different forest types have different associated carbon content.

**Density**
The density of carbon stocks associated with different forest types is determined with field surveys. On-the-ground field methods for sampling forests, used in determining carbon density, have been around for over 100 years and have long been accepted as scientifically credible. Methods entail sampling carbon pools in random, statistically significant and representative sections of forest, and extrapolating that information for the entire project area and/or country as a whole. Such extrapolations are standard practice in ecological surveying and the accuracy level of the results can be specifically calculated. Common sampling methods include measuring the diameter at breast height ("dbh") of live trees to determine size, and collecting soil, leaf litter and dead wood to be analyzed in the lab with precise instruments for carbon content. Field measurements, when used in combination with satellite imagery to track land cover change over time, allow for the calculation of carbon stock changes.

**Rate**
In the case of IFM activities, annual harvest rate is usually determined by historical management plans and on-the-ground surveys. For REDD activities, the annual rate of deforestation is typically obtained using satellite imagery to track land use change over time. Landsat satellites have been collecting data on land cover since 1972, with an ability to zoom into areas as small as 60 meters from 1972-1982 and 30 meters since 1982. Historical Landsat satellite data is available, for free, from the United States Geological Survey (USGS).

Significant advances have been made in interpreting satellite data and using it to precisely measure deforestation rates by comparing change in satellite photos taken over time on a pixel by pixel basis.

Other advances in the interpretation of Landsat satellite data now allow for the detection of degradation from logging and fire. Lidar (an optical remote sensing technology that measures properties of scattered light to find range and/or other information of a distant target) and radar technology may be used to reduce the need for on-the-ground field measurements in carbon stock calculation and can help overcome the challenge posed by clouds, which can hide the landscape in satellite photos. With time, these latter options are expected to become more economical and easier to use on large scales.

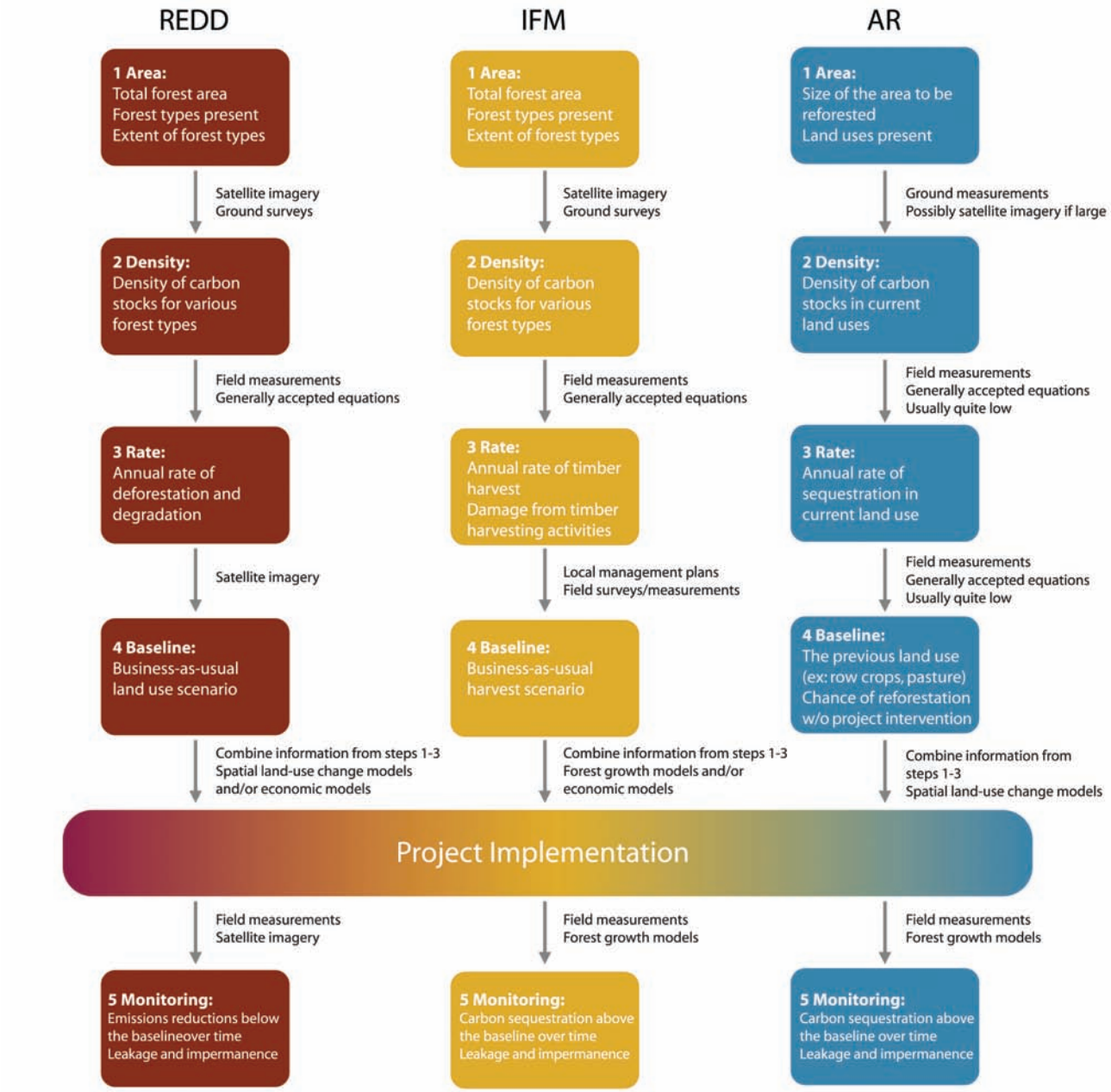
**Baseline**
Using information on area, density and rate, it is then possible to calculate the baseline; the business-as-usual emissions or sequestration scenario (baselines and "reference levels" are explained in more detail below). Along with the baseline emissions or sequestration scenario, it is necessary to calculate the scenario with interventions at the project and/or country level, since the difference between the two yields the carbon benefits from the activities. Calculation of the with-intervention emissions/ sequestration

scenario might involve running spatial land use change models for REDD or forest growth models in the case of IFM and AR.

**Monitoring**

The baseline is compared to the with-intervention scenario over time to determine carbon benefits attributable to REDD+ activities. In many cases, the baseline will be cross-checked with data at various points in the future to ensure the predicted scenario is still on target. Monitoring also allows actors to catch any instances of leakage and/or impermanence and apply appropriate discounts and buffers. (These concepts are covered below.)

**Figure 19**: General steps involved in carbon accounting for REDD, AR, and IFM (or SMF). Source: N. Virgilio, TNC



## 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 and/or that removals of greenhouse gas emissions have increased. But the question remains, emissions have been reduced or removals increased compared to what? This question takes us to our next concept, additionality, which is integrally linked to our third concept of reference levels.

The fundamental challenge for REDD+ mechanisms is to demonstrate "additionality." Additionality is simply defined for REDD+ as "carbon emission reductions and/or increased removals 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 or increased sequestration rates attributed to the project would not have occurred in the absence of carbon finance.

Additionality cannot be measured exactly, though there are suggested tests for determining whether emission reductions are additional. For national-level approaches, the only test that would generally apply is the reference level test; the other tests are important for project-level interventions.

- *Reference level Test*: First and foremost, emissions reductions are generally considered additional if they are below an accepted reference emission level representing the expected emissions in the absence of REDD interventions. In other words, emissions must be reduced against a 'business-as-usual' scenario. In the case of enhancing forest carbon stocks, sequestration rates would need to be above an established reference level. Reference levels 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.

## Reference levels

Reference levels are a benchmark that helps measure the change in forest carbon stocks and/or emissions over time, usually within a country. Reference levels encompass two basic concepts. The reference emission level (ReL) is the "amount of gross emissions from a geographical area estimated within a reference time period."[41] This only includes emissions, not sequestration from sinks such as regrowing trees through reforestation.

The reference level (RL) is "the amount of net/gross emissions and removals from a geographical area estimated within a reference time period.[42]" In contrast to ReL, this includes net measurements of all emission removals and sinks of the forest carbon pool. The UNFCCC negotiations have generally favored reference levels as they enable REDD+ accounting and crediting that includes the full REDD+ potential.[43] Informally, these are sometimes referred to as baselines and have been used interchangeably with the understanding that baselines – in the context of international negotiations -- refer to reference level approaches. Baseline is usually and more appropriately used in the context of projects as defined by methodologies as a business-as-usual or modeled scenario of future emissions.

There are various methods to establishing reference levels including:

- historical rates of land cover change
- projected business-as-usual (BAU) scenario using economic models;
- historical deforestation adjusted for factors representing national social-economic and developmental circumstances such as demographic trends, forest cover or GDP

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 RL in order to claim more credits from emission "reductions." International negotiators 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 projections.

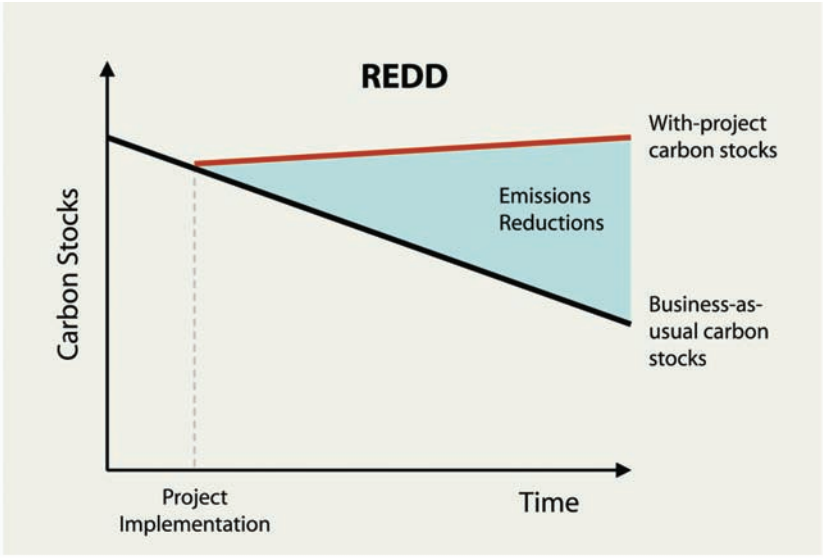
There are tradeoffs for each approach. A REDD+ mechanism that uses strictly historical reference levels would not create incentives for countries that have historically low rates of deforestation. Setting a reference scenario based on the historical deforestation rates of those countries would not allow room to generate many credits from avoided deforestation and discourage participation in the mechanism. To avoid this, a projection could be used that takes 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.

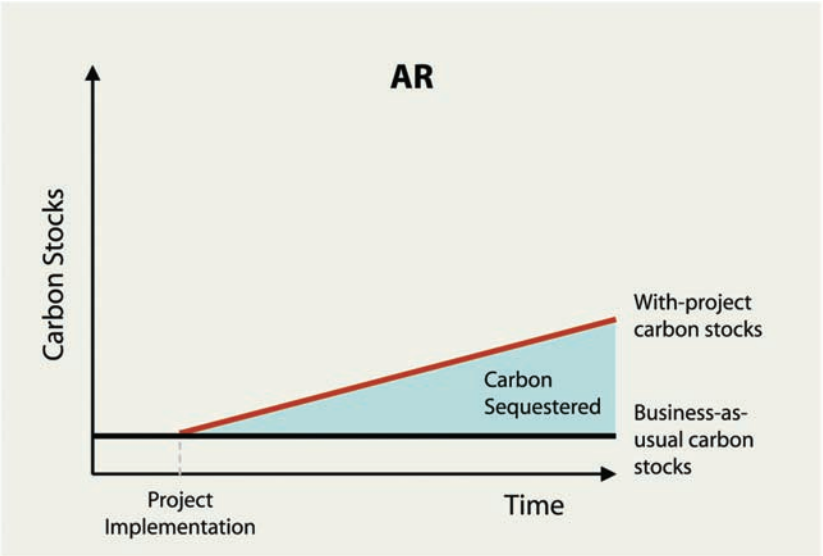
A political decision on how to establish RLs will ultimately be taken by the UNFCCC (or by national policy makers in the absence of a UNFCCC sanctioned REDD+ mechanism). REDD+ countries will probably establish a REDD+ reference level based on methodological guidance from the UNFCCC, or other guidance that represents international good practice, taking into account recent historical emissions, specific circumstances of each country, and 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.

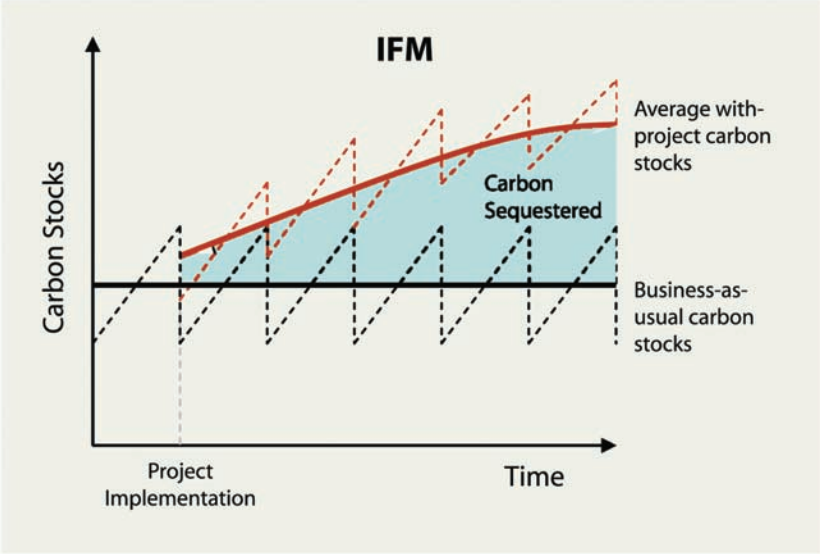
[41] REDDÝUNFCCC Expert Meeting (2009), Methodological issues relating to Reference Emission Levels and Reference Levels, 23Ý24 March 2009, Bonn, Germany.
[42] Ibid.
[43] Brazil, and other large emitters, have argued for ReL based on its simplified accounting and crediting for countries with a high BAU deforestation scenario

Figure 20 represents a basic baselines for various activities in REDD+. The figure uses carbon stocks rather than emissions as the metric. Baselines can also be based on emissions. The black line shows the level of carbon stocks that would occur if no action is taken and things continue as usual. The implementation of an activity that increases stocks is represented by the red line, which shows the new scenario that will occur as a result of the activity. The difference between the black line (the reference level) and the red line (stocks as a result of the activity) is the emission reduction or carbon sequestration that the activity achieved.

**Figure 20**: Generic illustrations of carbon benefits from REDD, Afforestation/Reforestation (AR), and Sustainable Management of Forests (or Improved Forest Management (IFM). REDD activities estimate pre=project forest carbon emissions through either historical data or modelled projections or a combination of both to determine the baseline. For AR activities, the baseline is often simply the carbon stocks pre-project land use. IFM or SFM activities use the average carbon stocks over the business-as-usual harvest cycle. Source: N. Virgilio, TNC






## Leakage

Two additional concepts, leakage and permanence, are integrally linked with carbon accounting, additionality, and reference levels. 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." While leakage can occur across national boundaries, most of the concern over leakage related to REDD+ has focused on project-level 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

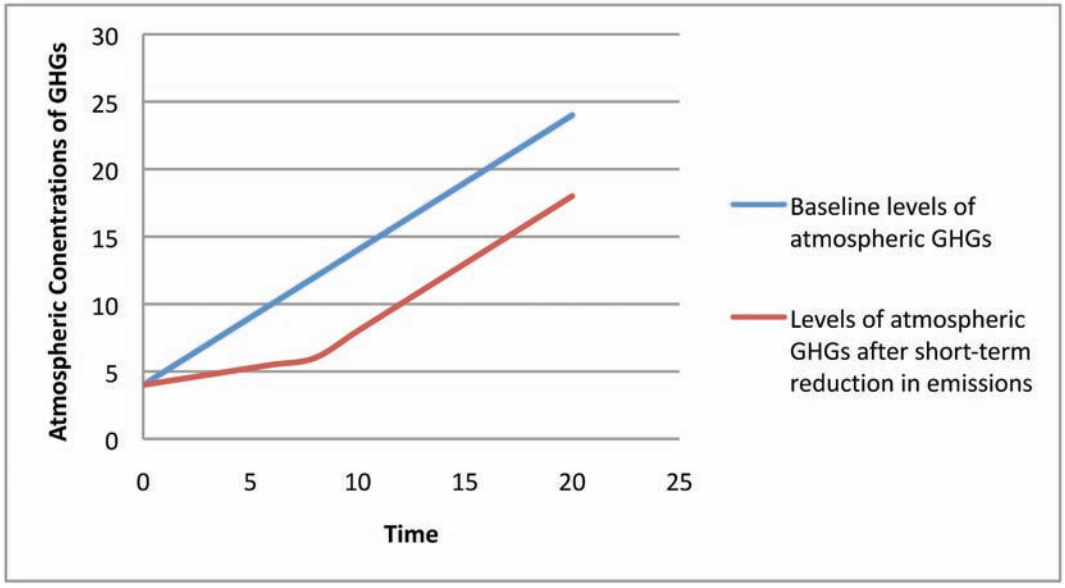
easily controlled but can be measured, modeled, and accounted for through discounting credits according to the estimated leakage.

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

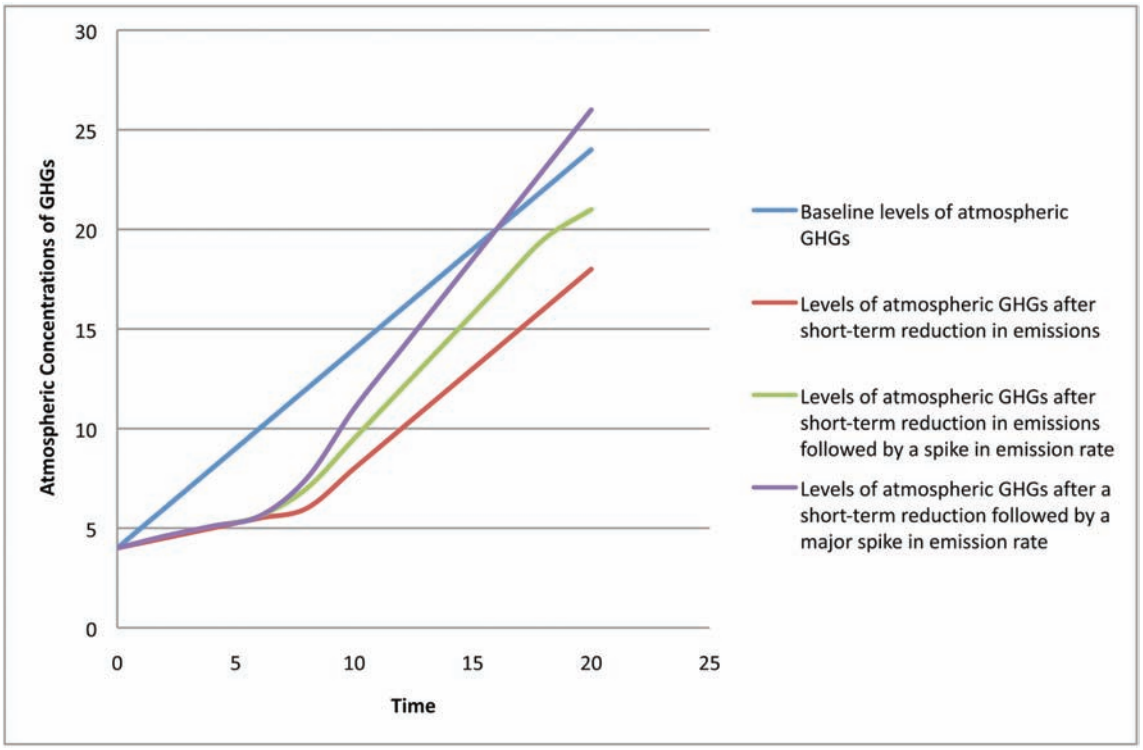
When considering whether an emission reduction is permanent, the underlying question is whether the levels of GHGs in the atmosphere are permanently lower than they would have been in the absence of policy. Permanence is thus determined both by the rate of emissions and the amount of carbon dioxide in 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 21 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 21**: 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 purple 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 green line in Figure 22 (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 22:** Impact of a one-time reduction in emission rates followed by a spike in emission rates




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.

## Reporting and Verification

Two more important technical steps in implementing REDD+ are reporting and verification. Requirements for reporting and verification will vary greatly depending on whether the approach is a national or sub-national.

*National approaches*

The UNFCCC has not yet established requirements for reporting and verification of REDD+ activities. It is likely, however, that countries that choose to participate in REDD+ will be required to report their emissions reductions and/or increases in removals to an international body. Whether the figures that countries report will be independently verified by a third-party is still under debate.

*Sub-national approaches*

Sub-national approaches to REDD+ could be expected to follow similar procedures as under the Clean Development Mechanism. Sub-national activities will likely need to be approved by the national government. The sub-national actors would then need to report their emissions reductions and/or increases in removals to an international body. The results would likely need to be verified by a certified auditor.

## Conclusion

This chapter defined and explained seven key technical elements of climate change mitigation and how these are dealt with in REDD+: measurement and monitoring, additionality, baselines, leakage, permanence, and reporting and verification. 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. SOCIAL CONSIDERATIONS

A REDD+ mechanism has the potential to generate many benefits for local communities and indigenous peoples, but there are also risks for communities as a result of the mechanism. Indigenous Peoples and local communities need to be involved in the design and implementation of a REDD+ mechanism and need to receive an equitable share of the benefits from REDD+ programs in order for them to be successful.

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 depend on the forest for their livelihoods.[44] Deforestation and climate change represent real threats to those communities and their traditional ways of living. Official Development Assistance (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 financial value except as timber or for conversion to agriculture. Whether these financial flow benefit or harm forest-dependent communities depends on 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. The most recent text negotiated at Copenhagen through the Ad-hoc Working Group on Long-Term Cooperative Action (AWG-LCA) includes some language on indigenous peoples and local communities.[45] It affirms the following safeguards should be in place for any REDD+ activities:

- Respect for the knowledge and rights of indigenous peoples and members of local communities, by taking into account relevant international obligations, national circumstances and laws, and noting that the General Assembly has adopted the United Nations Declaration on the Rights of Indigenous Peoples;
- Full and effective participation of relevant stakeholders, including in particular indigenous peoples and local communities in actions […];
- Actions that are consistent with the conservation of natural forests and biological diversity, ensuring that actions [….] are not used for the conversion of natural forests, but are instead used to incentivize the protection and conservation of natural forests and their ecosystem services, and to enhance other social and environmental benefits

This section describes 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.

### Potential Benefits

The unrelenting march of deforestation directly threatens the lives and livelihoods of indigenous peoples worldwide. REDD+ offers a significant new opportunity to effectively halt this destruction and protect the forests that indigenous peoples live in and depend upon.

In addition to protecting standing forests and their resources, other potential benefits of REDD+ for forest-dependent communities include direct payments based on the maintenance of intact forest, employment opportunities, additional sources of income for communities, and training in natural resource management.

[44] FAO Facts and Figures: http://www.fao.org/forestry/28811/en/
[45] FCCC/AWGLCA/2009/L.7/Add.6

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 continue for decades.

## Risks and Safeguards

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 despite their right to participate in decision making in accordance with the principle of free, prior and informed consent. 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.[46] 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.

The REDD+ Social & Environmental Standards[47] are another REDD+ initiative that seeks to ensure forest carbon programs "respect the rights of Indigenous Peoples and local communities and generate significant social and biodiversity co-benefits." The standards are intended to work for a new global REDD+ regime emerging from the UNFCCC negotiations including government-led programs at national or state/provincial/regional level regardless of fund or market-based financing.

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 of 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.

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. These include:

- **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

[46] Climate, Community & Biodiversity Alliance: http://www.climate-standards.org
[47] http://www.climate-standards.org/REDD+/index.html

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 Levels**: If reference levels 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.

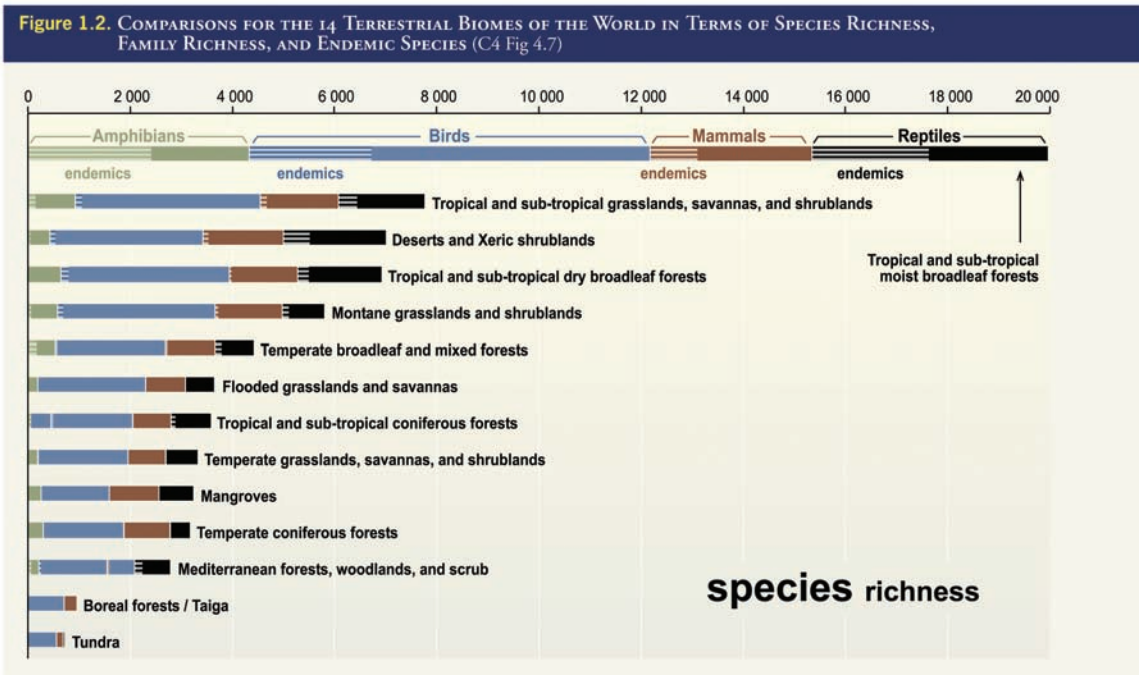
- **Level of continued access to the forest**: Forest-dependent communities utilize the forest for many essential goods and services, such as food, water, firewood, and medicines. A REDD+ mechanism has the potential to improve the long-term availability of those goods and services by providing adequate 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.

All of these issues, and others, will need to be worked out at the international, national, and/or local levels. Indigenous Peoples and local communities need to be fully and effectively involved in those debates in order to promote a positive outcome. This will require not only providing access to relevant forums, but also ensuring that information is provided in a timely manner and an appropriate language, that adequate time is provided for consultations and decision-making, and that free, prior, and informed consent is respected for activities that impact indigenous peoples.

## 2.4. BIODIVERSITY AND OTHER ECOSYSTEM SERVICES

Tropical forests cover about 7% of the land area on Earth, but harbor an incredible 70% of known terrestrial species. Tropical forests contain a very high proportion of endemic species (see Figure 23). 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. As people clear large areas of tropical forests, entire species are vanishing, many of them unknown.

**Figure 23**: Species Diversity of Terrestrial Ecosystems




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

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.

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.

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. It is not guaranteed, however, that REDD+ will benefit biodiversity. 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. Researchers have pointed out many ways in which REDD+ could be designed and implemented to prioritize biodiversity conservation, by adding certification standards, guidelines or specific incentives for biodiversity conservation. A few key design elements for REDD+ to enhance biodiversity and mitigation are:[48]

- Promote REDD+ (deforestation, degradation, forest conservation, carbon stock enhancement, and sustainable management of forests);
- Continue to target biodiversity priorities with additional funding;
- Design the REDD+ framework to minimize international leakage;
- Develop appropriate definition of "forests."

We will examine each of these elements in turn.

## Promote REDD+

The inclusion of activities beyond reducing emissions from deforestation and forest degradation (i.e. including the "plus" elements) has the potential to enhance the benefits to biodiversity and ecosystem services. Below we describe some of the potential benefits of including conservation, sustainable management of forests, and enhancement of forest carbon stocks.

Compensation for protecting forest carbon stocks that have not historically been under threat is important for promoting broad participation in a REDD+ mechanism and thereby reducing the threat of international leakage. Incentives for conservation are especially important for countries with high forest cover and historically low deforestation rates (HFLD). HFLD countries contain large tracts of intact forest that are large storehouses of biodiversity and provide important ecosystem services that contribute to adaptation, reduce vulnerability and enhance species resilience in addition to providing carbon sequestration. A REDD+ mechanism that excludes countries with low historic rates of deforestation will likely result in the displacement of deforestation and forest degradation pressures and a net increase in emissions from those countries omitted from a REDD mechanism.[49]

The enhancement of existing carbon stocks through afforestation, reforestation, restoration, and sustainable management will contribute significantly to the success of REDD+ for mitigation of greenhouse gases and for the enhancement of other forest ecosystem services. Forest restoration (the process of assisting the recovery of native species and carbon stocks in a standing forest that has been degraded or damaged) has a large mitigation potential[50] and can improve the resilience of remaining intact forests. Reforestation and afforestation can make a REDD+ strategy more effective by diverting activities such as harvesting and fuelwood extraction from intact primary forests. In order to ensure ecosystem integrity and function, afforestation and reforestation efforts should prioritize the use of native tree species appropriate to the local habitat and be conducted only on ecologically appropriate lands.[51] Policy measures to prevent the conversion of natural forests or other natural ecosystems to plantations are critical to safeguarding ecologically valuable lower-carbon ecosystems.

Sustainable management of forests, when conducted in accordance with the appropriate ecological and environmental guidance (i.e., recognized environmental standards such as the Forest Stewardship Council's principles and criteria), can limit carbon losses and enhance ecosystem services relative to business-as-usual management practices. Production forests, whether under industrial-scale concessions

[48] Harvey, C.A., Dickson, B., and Kormos, C., 2010, Opportunities for achieving biodiversity conservation through REDD, Conservation Letters 3, p. 53–61
[49] Busch et al, 2009
[50] Blaser, J. and C. Robledo. Initial Analysis on the Mitigation Potential in the Forestry Sector. Intercooperation, Bern, August 2007
[51] Parrotta et al. 1997. Catalyzing native forest regeneration on degraded tropical lands. Forest Ecology and Management 99(1-2):1-7.

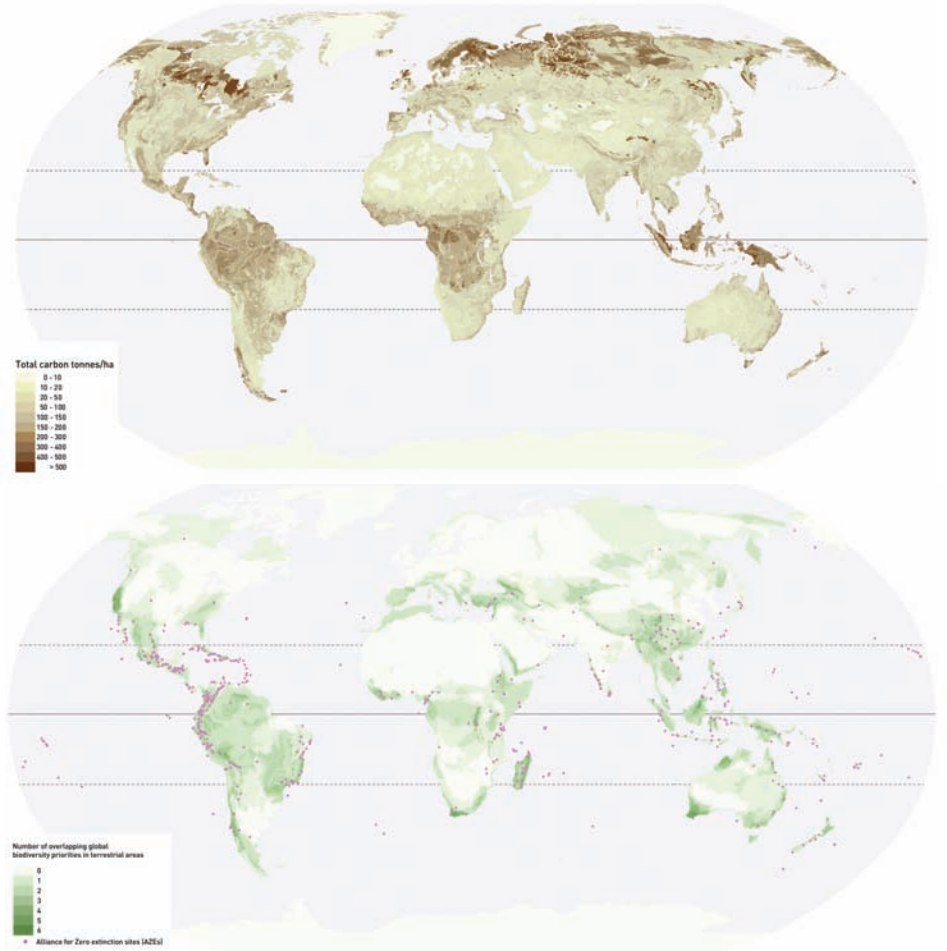
or community control, typically represent an important function of nations' forest estates. Given increasing global demand for wood products, forestland lying outside of effectively managed protected areas may be at risk of degradation and eventual deforestation. Providing for the legal harvest of timber under carefully developed management plans that include responsible logging techniques and independent third-party monitoring, the core elements of a sustainable management regime, reduces the risk of deforestation in vulnerable forests.

## Target Funding

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.[52]

**Figure 24**: Carbon and Biodiversity Map




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

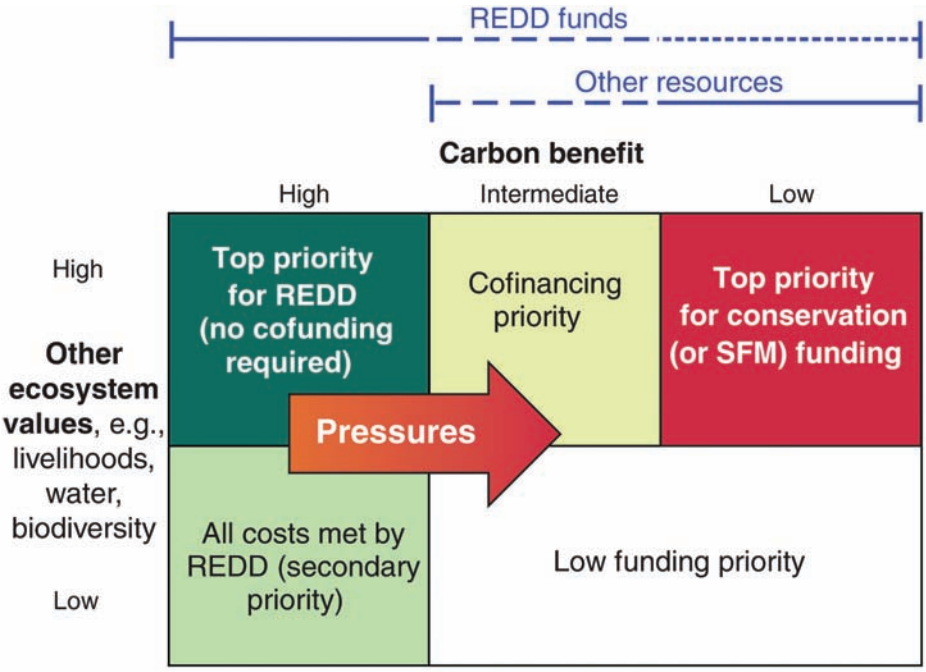
[52] United Nations Environment Program World Conservation Monitoring Centre, 2008, Carbon and Biodiversity, A Demonstration Atlas

The two maps shown in Figure 24 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. Figure 25 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 25**: 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

## Minimize International 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.

## Develop an Appropriate Definition of Forest

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.

# SECTION 3:

## UNDERSTANDING THE INTERNATIONAL CONTEXT

**3.1. International Negotiations**
**3.2. Outstanding Policy Questions**
**3.3. REDD+ Financing**

## 3.1. INTERNATIONAL NEGOTIATIONS

### Historical Policy Context: The Adoption of the UNFCCC

Almost twenty 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 was a shared resource that can be destabilized by emissions of greenhouse gases from human activity, the international community adopted the United Nations Framework Convention on Climate Change (UNFCCC). The Convention defines an overall framework for intergovernmental efforts to tackle the challenges posed by climate change. It recognized that climate change was a global problem that required a global solution.

The overall of the Convention, as included in its Article 2, 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's mandate also covers "all relevant sources, sinks, and reservoirs of greenhouse gases." The UNFCCC has been ratified by 193 countries and it entered into force on March 21, 1994.[53] The United States was the first developed country to ratify the Convention. It is intended to allow governments i) to gather and share information on greenhouse gas emissions, national policies and best practices; ii) launch national strategies for addressing greenhouse gas emissions and adapting to expected impacts, including the provision of financial and technological support to developing countries; and iii) cooperate in preparing for adaptation to the impacts of climate change.[54]

#### 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 developed country parties 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.

[53] http://unfccc.int/essential_background/convention/items/2627.php
[54] UNFCCC, Status of Ratification http://unfccc.int/essential_background/convention=

**Figure 26:** below provides a timeline of key events that have occurred in the UNFCCC process.

**Convention Timeline**

| | |
|---|---|
| 2010 | NOV/DEC: **COP 16 & CMP 6 (Mexico)** |
| 2009 | SEP: **Summit on Climate Change, UN Headquarters (New York, USA)** |
| | DEC: **COP 15 and CMP 5 (Copenhagen, Denmark)** Copenhagen Accord |
| 2008 | DEC: **COP 14, CMP 4 (Poznań,Poland)** |
| 2007 | DEC: **COP 13 and CMP 3 (Bali, Indonesia)** |
| | SEP: **High-level Event on Climate Change, UN Headquarters (New York, USA)** |
| 2006 | NOV: **COP 12 and COP/MOP 2 (Nairobi, Kenya)** Nairobi Work Programme on Adaption |
| 2005 | NOV/DEC: **COP 11 and COP/MOP 1 (Montreal, Canada)** |
| | FEB: Entry into 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 Delhi, India)** Delhi Declaration |
| | AUG/SEP: **Progress since 1992 reviewed at World Summit on Sustainable Development** |
| 2001 | OCT/NOV: **COP 7 (Marrakesh, Morocco),** Marrakesh Accords |
| | JUL: **COP 6 resumes (Bonn, Germany),** Bonn Agreements |
| | 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 of Action |
| 1997 | DEC: **COP 3 (Kyoto, Japan),** Kyoto Protocol adopted |
| 1995 | MAR/APR: **COP 1 (Berlin, Germany),** Berlin Mandate |
| 1994 | MAR: **Convention enters into force** |
| 1992 | JUN: **Convention opened for 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 established** |
| 1979 | **First World Climate Conference (WCC)** |

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

## Historical Policy Context: The Kyoto Protocol

The UNFCCC does not formulate specific emission reduction targets, but lays out a process by which various agreements containing more specific commitments can be negotiated. The first of such protocols was negotiated in Kyoto, Japan in 1997. The major features of the Kyoto Protocol are 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:[55]

- Annex I: Developed countries that assume quantified emission reduction and limitation targets
- Non-Annex I countries: Developing countries

Under the protocol, mandatory limits on the emission of greenhouse gases were placed on Annex I countries under the principle of "*common but differentiated responsibilities*". No binding requirements were placed on developing countries.

Though the Kyoto Protocol has been criticized for inadequate measures to combat global warming, economic inefficiencies, and failure to commit developing nations to binding reductions, it remains the only official global strategy for mitigating climate change. One of the Kyoto Protocol's most significant accomplishments was the basic infrastructure and rules for international emission trading and the creation of so-called flexible mechanisms that include project-level mechanisms to reduce emissions such as the Clean Development Mechanism (CDM) and Joint Implementation (JI).

The Kyoto Protocol establishes a cap-and-trade system that allows Annex I countries to trade allowances with other Annex I countries.[56] In addition, the protocol creates two project-based mechanisms that add flexibility to the way developed countries can meet their emission reduction obligations:

- *Joint Implementation* (JI): emission reduction projects located in Annex I countries can generate credits which can be transferred to other Annex I countries and used for compliance.
- *Clean Development Mechanism* (CDM): emission reduction projects located in developing countries can generate compliance-grade credits.

The CDM is the only means by which developing countries can participate in achieving compliance of emission reduction targets under the Kyoto Protocol. The cost of greenhouse gas mitigation varied significantly between countries and therefore it is more cost-effective to implement emissions reductions projects in countries where the costs were lowest. CDM projects are also meant to contribute to the sustainable development goals of the developing country. Kyoto Protocol parties have authorized private entities to participate in the flexible mechanisms, which established the ground-rules for private sector driven carbon markets.

*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. Specific rules for achieving targets were not developed until the 7th session of the Conference of the Parties to the UNFCCC held in Marrakesh in 2001, including rules for incorporating emissions from land use, land use change, and forestry (LULUCF) into the accounting system. The treatment of LULUCF in the context of the Kyoto Protocol always has been controversial. Many have seen it as simply a way to offset emissions from the energy sector rather than as an effective and cost-

[55] It should be noted that technically only the UNFCCC lists developed countries as Annex I. The Kyoto Protocol assigns emission reduction obligations to many of these same obligations under Annex B of the Kyoto Protocol. This listing closely but not exactly corresponds to Annex I countries under the UNFCCC. However, in popular terminology, "Annex I countries" refer to developed nations that have taken on emission obligations.

[56] Cap-and-trade systems will be explained in the next section

efficient means of greenhouse gas mitigation. While reforestation and afforestation, as well as certain agricultural practices, are eligible activities under the Clean Development Mechanism, restrictive accounting and design standards have made forestry projects less economical than comparable industrial or energy projects (although agricultural waste and manure management projects can be quite economically attractive).

Nevertheless, the Kyoto Protocol requires Annex I countries account for the changes in GHG emissions associated with afforestation, reforestation, deforestation as well as all land use activities undertaken since 1990. Developing countries can only claim credits generated from afforestation and reforestation through the CDM but not from avoided deforestation.

*Proposals for inclusion of REDD+*

After a number of failed earlier attempts to create incentives for avoided deforestation under the Kyoto Protocol, a renewed effort to include what later became REDD+ was launched at the 11th session of the Conference of the Parties to the UNFCCC (COP-11) in 2005. Costa Rica and Papua New Guinea submitted a RED proposal on behalf of the Coalition of Rainforest Nations. This proposal was welcomed by the parties to the UNFCCC as a positive signal of developing countries and their willingness to undertake emission reduction efforts at the national scale given appropriate policy incentives.

The submission at COP-11 launched a two-year process coordinated by SBSTA to assess technical aspects of what has since become REDD+. This process has focused on the documentation and exchange of relevant scientific, technical, and methodological considerations and experiences. Parties have actively engaged in the debate and developed several policy proposals for an accounting and policy framework for REDD+. These proposals vary on the details of rewarding emission reductions and policy incentives, but converge on the desire to create measurable, reportable, and verifiable emission reductions from REDD+ activities. The table below summarizes some of the most recent proposals from governments and organizations such as NGOs. For a more comprehensive review of all proposals on the table, please refer to The Little REDD+ Book, by the Global Canopy Programme, available at: www.globalcanopy.org.

**Table 8**: Summary of REDD+ proposals: NGOS

| Proposal | Scale | Reference Level | Financing | Scope | Incentives for historically low emitters |
|---|---|---|---|---|---|
| Compensated Reductions[58] | 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" |
| Incentive Accounting[59] | Global | Historic based | Fund | Deforestation | Global average emissions rate used |
| Corridor Approach[60] | | Historical adjusted | Combination of several approaches. | Deforestation and degradation | Allows them to participate through sub-national activities |
| Carbon Stock[61] | National and sub-national | C 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[62] | 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[63] | Not specified | Not specified | Separate, non-fungible market | Deforestation and degradation | Not specified |
| T-DERM[64] | National | Historic | Market-linked fund | Deforestation and degradation | Different funding programs for countries with different circumstances. Developing countries accurately monitor and report on their mitigation actions to receive higher return for services. Strong incentives for countries to improve forest |

[58] 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

[59] Joint Research Center, Mollicone, D., Achard, F., Federici, S., Eva, H., Grassi, G., Belward, A., Raes, F., Seufert, G., Matteucci, G., and Schulze, E., 2007, Avoiding deforestation: An incentive accounting mechanism for avoided conversion of intact and non-intact forests

[60] Joanneum Research Center, 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

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

[62] Center for Social and Economic Research On the Global Environment (CSERGE), Strassburg, B., Turner, R.K., Fisher, B., Schaeffer, R., An Empirically-Derived Mechanism of Combined Incentives to Reduce Emissions from Deforestation, CSERGE Working Paper ECM 08-01

[63] Center For Clean Air Policy (CCAP), Oganowski, M., Helme, N., Movius, D., and Schmidt, J., REDD, The Dual Markets Approach. Center for Clean Air Policy

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

| | | | | | |
|---|---|---|---|---|---|
| | | | | | protection programs. |
| Stock-Flow with Targets[65] | Global/ national | Historic | Market and fund | Deforestation and degradation | Financing distributed based on reductions against historic emissions rates and based on existing carbon stocks.<br>Stock funds are available for countries with low rates of deforestation. |
| Nested Approach[66] | National/sub-national | Historical adjusted | Market and phase approach | Deforestation and degradation | Allows them to participate through sub-national activities. |
| Terrestrial Carbon [67] | National and sub-national | Projected | Market and fund | Deforestation, degradation and enhancement | Provides incentives based on carbon stocks (not historic emission rates) |
| Carbon Stores[68] | Not specified | Not specified | Market | Deforestation, degradation | Compensate developing countries with both high and low historical deforestation rates for maintaining and maximizing carbon stocks based on extent land is maintained, degraded below or restored to its natural<br>carbon carrying capacity |
| Avoiding REDD Hot Air[69] | Not specified | Historical | Market and fund | Deforestation and degradation | Not specified |
| Integrated Incentives approach[70] | National with optional project level (only if national emissions are below national reference level) | Historical. Emissions levels references set by 10-year moving national historical average | Market, market linked measures, fund. | Deforestation and degradation | Proposed stabilization facility to address equity concerns among countries with historically low rates of deforestation. |
| Compensated Successful Efforts[71] | Not specified | Not specified | Fund | Deforestation | Not specified |

[65] Woods Hole Research Center and IPAM, 2008, How to Distribute REDD Funds Across Countries? A Stock-Flow Approach
[66] Tropical Agriculture Research and Higher Education Center (CATIE), Pedroni, L., Dutschke, M., Estrada Porrua, M., Michaelowa, A., García Guerrero, A., and Oyhantçabal, W., http://www.catie.ac.cr. Based on the original The "Nested Approach" initially put forward by CATIE and the German Emissions Trading Association BVEK
[67] The Terrestrial Carbon Group, 2008, How to Include Terrestrial Carbon in Developing Nations in the Overall Climate Change Solution
[68] Human Society International (HIS), Graham, A., Holesgrove, R., Beynon, N.
[69] International Institute for Applied Systems analysis (IASA), Obersteiner, M., et al.
[70] The Nature Conservancy, Griscom, B., Fishbein, G., Cortez, R. et al.
[71] Institute for Sustainable Development and International Relations (IDDRI), 2008, Combes Motel, P., Piard, R., Combes, J.-L.

**Table 9**: Summary of various REDD+ proposals: Governmental

| Proposal | Scale | Reference Level | Financing | Scope | Incentives for historically low emitters |
|---|---|---|---|---|---|
| Alliance of Small Island States (OASIS) | National and sub-national | Historical adjusted | Fund | Deforestation and degradation | Approaches to establishing national reference levels are flexible and depend on national circumstances. |
| Australia | National and sub-national | Projected | Market-linked w/ financial support mechanisms | Deforestation, degradation and enhancement | Not specified |
| Brazil[72] | National | Historic over a period of 4 years | Fund | Deforestation | None |
| Canada | National | Historical adjusted with national circumstances | | Deforestation and degradation | Not specified |
| Coalition for Rainforest Nations (CfRN) | National | Historical adjusted. Historical data over a period of at least five years | Market w/ transitional financial support mechanisms | Deforestation and degradation | Use of developmental adjustment factor that introduces circumstances and capabilities in countries with historically low rates of deforestation. |
| China | National and sub-national approaches | Not specified | Not specified but open to discuss both market and non market mechanisms | Deforestation, degradation and enhancement | Not specified |
| Colombia | National and sub-national | Historical adjusted | Fund | Deforestation, degradation and enhancement | Funds used to support forest conservation and forest carbon stock enhancement. |
| Central Africa Forest Commission (COMIFAC) | National and sub-national | Historical adjusted. Historical reference emissions rate with a development adjustment factor | Fund and market mechanisms. Funding in transitional periods | Deforestation and degradation | Not specified |
| European Union | National and sub- | Historical adjusted. | Market linked measures | Deforestation, degradation and | Not specified |

[72] Brazilian Perspective on Reducing Emissions from Deforestation. Submission to the UNFCCC SBSTA, 2006

| | | | | | |
|---|---|---|---|---|---|
| | national admitted in exceptional circumstances | | | enhancement | |
| India | National | Historical | Market. (Limit in the use of REDD credits). Financing for transitional periods | Deforestation, degradation and enhancement | Proposal of a “Compensated Conservation” that rewards countries for maintaining and increasing their forests as a result of conservation |
| Indonesia | National | Historical and projected | Market and funds. Combination of funding in a transitional period | Deforestation, degradation and enhancement | Not specified |
| Japan | National | Historical adjusted | Not specified | Deforestation, degradation and enhancement | For countries with low deforestation and degrade future socioeconomic trends can be considered in the establishment of reference levels |
| Malaysia | National and sub-national | Historical adjusted | Not specified but considers necessary funds for institutional and capacity development | Deforestation and degradation | Not specified |
| Mexico | National | Historical adjusted with national circumstances. | Market with support funding for capacity building, conservation, sustainable forest management | Deforestation and degradation | Not specified |
| New Zealand | National | Not specified | Open to market and funds. Phased approach w/ different financing mechanism | Deforestation and degradation | Not specified |
| Norway | National | Historical adjusted | Fund and market mechanisms | Deforestation, degradation and | Incentives to enhance carbon stocks in existing forests. Reference levels should consider the reality of low rates |

| | | | | | |
|---|---|---|---|---|---|
| | | | | enhancement | of deforestation |
| Panama | Global, national and sub-national | Historical adjusted | Market and fund fed out of allowances and AAUs | Deforestation and degradation | Setting of reference scenarios should not disfavour countries with traditionally low deforestation rates |
| Tuvalu | Not specified | Not defined but propose an ex-post assessment of reference levels. | Market and non-market sources of funding for capacity building and early action | Deforestation and degradation | Not defined. |
| USA | Not specified | Not specified | Not defined | Deforestation, degradation and enhancement | Not specified but firmly supports land degradation and carbon storage on managed lands |

At COP-13 in Bali in 2007, negotiators adopted the Bali Action Plan (and Bali Roadmap) that established a two-year negotiating process to create a text leading to an international binding framework for international climate policy for adoption at COP-15 in December 2009 in Copenhagen. Debate in Bali was intense, and the inclusion of REDD was in doubt until the final moments. However, the Bali Action Plan ultimately made REDD a part of a post-2012 mitigation strategy, and Parties agreed that the technical capacity to measure and monitor REDD with sufficient accuracy was in place.

COP-14 in Poznan, Poland represented the half-way point in the two-year roadmap laid-out in Bali. Little progress on REDD+ was made in Poznan, and most of the critical policy issues remained under negotiation for the following year. Months of intense negotiations, inter-sessional meetings and workshops followed during 2009, leading up to COP-15 in Copenhagen.

**Status of Indigenous Peoples in REDD+ negotiations**

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 attended COP-14 and strongly voiced these concerns through side events, statements, and demonstrations. Many indigenous groups worried that without a seat at the table and without formal rights to their traditional lands, REDD+ may have adverse impacts on their way of life and/or they may get left out of compensation schemes for environmental services. The SBSTA decision adopted at COP-14 stresses therefore 'the need to promote the full and effective participation of indigenous people and local communities, taking into account national circumstances and noting relevant international agreements'. While marking a first step towards recognizing the relevance of indigenous people involvement in REDD+ policy design and implementation, the decision text received strong criticism from NGOs for insufficiently protecting the rights of indigenous peoples.

Responding to pressure from country delegations and indigenous groups, the draft REDD+ decision of COP-15 affirms and strengthens references to indigenous peoples and the role that they have to play in REDD+. In the draft decision UNFCCC parties support the development of safeguards to ensure 'Respect for the knowledge and rights of indigenous peoples and members of local communities, by taking into account relevant international obligations, national circumstances and laws, and noting that the General Assembly has adopted the United Nations Declaration on the Rights of Indigenous Peoples' and 'Full and effective participation of relevant stakeholders, including in particular indigenous peoples and local communities in actions' relating to design and implementation of REDD+ policies.

## Current Policy Context

The 15th session of the conference of the parties to the UNFCCC (COP-15) concluded without reaching agreement on a global treaty defining the framework for international climate action and finance. The AWG-LCA will continue deliberations into 2010. A number of heads of state did manage to agree on a political statement – the Copenhagen Accord. The Copenhagen Accord was however not adopted by the COP, but was "noted.".

The Copenhagen Accord makes explicit reference to REDD+, although such reference remains aspirational and concrete implementation arrangements remain unclear. Paragraph 6 of the Accord addresses REDD(+):

"*We recognize the crucial role of reducing emission from deforestation and forest degradation and the need to enhance removals of greenhouse gas emission by forests and agree on the need to provide positive incentives to such actions through the immediate establishment of a mechanism including REDD-plus, to enable the mobilization of financial resources from developed countries*."

Another concrete outcome of Copenhagen on REDD+, was the adoption of a SBSTA decision on REDD+. Some of the main points in that decision include:

- The need for the full and effective engagement of indigenous peoples and local communities in monitoring and reporting was recognized;
- The 2006 IPCC guidelines were accepted as the basis for estimating forest-related greenhouse gas emissions and removals;
- Developing countries were requested to identify the drivers of deforestation and associated activities to address those drivers and reduce emissions and increase removals;
- All Parties (developing and developed countries) were encouraged to help build the capacity of developing countries to develop emissions and removals estimates;
- It was decided that the process for establishing reference levels (baselines) would need to take into account historic data and adjust for national circumstances.

In addition to the SBSTA decision, significant progress was made within the negotiations in the AWG-LCA. The negotiators were able to reach consensus on several principles related to REDD+, as well as language regarding safeguards for indigenous peoples and local communities and on biodiversity and ecosystem services. The negotiators also agreed that the scope of REDD would include all aspects of the Bali Action Plan (i.e. would be "REDD-plus"). However, some important policy questions were not addressed in Copenhagen and will need to be worked out in future negotiations. The main outstanding issues include:

- Sources of financing for REDD+ (market and/or non-market sources);
- Scale of accounting and monitoring (national and/or sub-national); and
- The relationship of REDD+ to Nationally Appropriate Mitigation Actions (NAMAs)

Although the UNFCCC negotiations will progress throughout 2010 and beyond, the Copenhagen Accord also recognizes the need for prompt action and short term REDD+ financing. It contains a pledge by the US, UK, France, Australia, Japan, and Norway to contribute USD3.5 billion over three years to REDD+. The Governments of Norway and France are currently facilitating a process that is expected to produce the organizational and institutional arrangements to coordinate fast-track action on REDD+.

The recognition of the need for alternative venues to discuss and decide on REDD+ (as well as on other mitigation and adaptation action) is reflected in the increased number of multilateral and bilateral efforts to address REDD+. Venues and platforms attempting to address REDD+ range from (i) parallel discussions and negotiations under other treaties (CBD, CCD); to (ii) statements and declarations in high level meetings (G-8, G-20); to (iii) the efforts of various international organizations to fast-track REDD+ implementation (the World Bank, African Development Bank). Finally, REDD+ is supported by a number of dedicated networks and collaborative efforts (Coalition of Rainforest Nations, the Prince of Wale's Rainforest Project).

## 3.2. OUTSTANDING POLICY QUESTIONS

Despite the progress made in Copenhagen, a number of key political issues related to REDD+ are still unresolved and subject to negotiation. This section will explore each of those.

*1) At what scale should incentives be granted, at the national scale, sub-national scale, or both?*

One of the main policy issues being discussed in the UNFCCC REDD+ negotiations is the appropriate scale of the mechanism. The core question in this debate is whether sub-national activities and projects undertaken outside of a national accounting framework can interact directly with an international mechanism, whether national governments are the sole entities with access to international incentives, or whether it would be possible for both scales to interact simultaneously with the international system. Developing comprehensive assessments of the options is essential to informing sound policy decisions on the design of REDD mechanisms in both international and US policy.

Proponents of crediting projects (allowing projects to sell directly into international carbon markets) see projects as a way for countries to build capacity to eventually create national accounting frameworks, while taking near-term steps to reduce deforestation. Additionally, investing directly in projects is perceived as more attractive for most private investors because it is more transparent, with more control over the outcomes, than investing in a national government initiative.

Those who favor only allowing national governments to sell REDD credits assert that sub-national approaches 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. They also point out that sub-national approaches offer less political benefit in that they will involve a lower level of engagement of developing countries in a post-2012 framework. There are many advantages and disadvantages to each approach, and the approaches are not mutually exclusive. Nested approaches and/or sequential approaches are also possible. .

The scale of granting incentives for REDD+ was one of the most contentious issues in the negotiations on REDD+ in Copenhagen. The draft negotiating text from Copenhagen contains brackets around the paragraphs dealing with this issue – indicating that agreement has not been reached.

*2) Funding: Market and non-market approaches*

The source of REDD+ finance also remains controversial. Under a market-based approach, REDD+ activities would generate credits that could be acquired by governments or traded by private entities in international carbon markets. Companies or entities that face emissions reductions commitments under a cap-and-trade system could possibly use 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 result in unpredictable volumes of credits, substantially lower prices, windfall profits, and reduce the incentives for Annex-I countries to meet their commitments domestically.

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 and market 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. Additionally, different funding sources could be used for different activities. For example, market funding could be used for REDD and for afforestation/reforestation while non-market funding could be used for conservation.

This issue will be dealt with over the coming year in the AWG-LCA discussions on REDD+.

*3) REDD+ Relationship to NAMAS*

REDD+ may be established as a stand-alone mechanism or REDD+ could be incorporated into nationally appropriate mitigation actions (NAMAs), which are developing country mitigation actions called for under the Bali Action Plan. A number of Parties wish to include REDD+ under the NAMA umbrella, while others see advantages to keeping them separate.

Theoretically, REDD+ as a NAMA would promote efficiency, facilitate consistent and comparable MRV systems, streamline funding, create institutional efficiency and generate cross-linkages between sectors. However, linking REDD+ and NAMAs may also create some challenges. The NAMA negotiations have moved at a slower pace than the REDD+ negotiation and many important aspects of NAMAs remain undefined. It is therefore unclear whether the NAMA framework will be appropriate for REDD+ or not.

*4) Level of Ambition*

Many countries would like to set a goal for the level of emissions reductions that should be achieved globally by a set time period (for example, to reduce emissions by 50% by 2020). Many developed countries would like such a goal to be established so that they can ensure that their financial commitments are achieving a significant result. Many developing countries would also like to establish a global goal, but they would like that goal to be linked to a level of committed financing from developed countries. The countries have not yet reached agreement on these figures.

## 3.3. REDD+ FINANCING

In order to be effective, substantial funding will be necessary for REDD+, regardless of the source. Figure 27 summarizes some of the estimates of how much funding is needed for REDD.

**Figure 27**: Range of estimated cots for reducing emissions from deforestation and forest degradation. Note: Most of the estimates are for reductions by the year 2020, but the Eliasch Review considers reductions by 2030, the IWG-IFR report considers reductions for 2010 to 2015, and the Busch et al. analysis is a historical simulation over 2000-2005. The Meridian Institute report reviews results from various studies for reductions by 2020 to 2030. References for this figure listed at the end of this document.

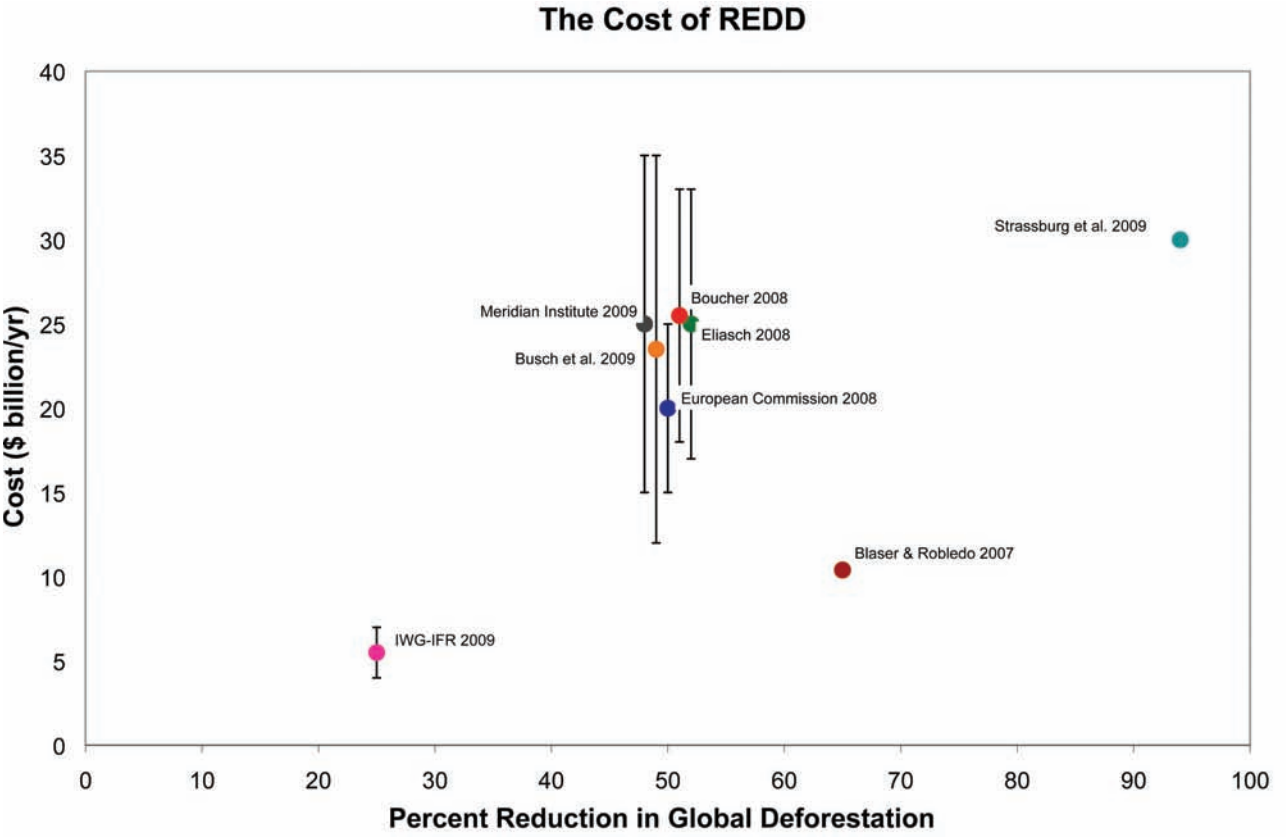


Figure 27 illustrates the estimated need for REDD+ finance. There are two primary potential sources for providing that finance: public funding and market-based funding. This section will describe each option.

**Public Funding**

Public funding for REDD+ can be provided from a number of sources, including new and additional Overseas Development Assistance (ODA) dedicated to REDD+, allocations of revenues generated from cap-and-trade systems in developed countries, and taxes. Several countries have made pledges to provide public funding for REDD+, including $3.5 billion pledged by Australia, France, Japan, UK, United States, and Norway in Copenhagen. Public funding is regarded as especially important in the early phases of REDD+ in order to help countries establish monitoring systems, gather and analyze data necessary to define a reference level, and create national strategies. Additionally, public funding is seen as critical for financing certain policies and measures at the national level that are needed to make REDD+ successful.

**Market Finance**

Another potential source of funding for REDD+ is market finance. 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 will be lowered.

REDD+ could potentially be a source of emission reductions credits that could be sold in carbon markets to reduce the overall cost of compliance and provide a substantial source of funding to developing countries to reduce deforestation and enhance forest carbon stocks. Carbon markets can be confusing, so this section provides details on how they work.

## 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 (or cap) on emissions of a particular pollutant such as CO2. The regulator authorizes a number of "allowances" permitting the release of emissions in a volume equal or lower than the total cap. These allowances are issued, auctioned, or distributed in some way to regulated emitters. Each allowance represents the right to emit a certain amount (usually one ton) of the regulated pollutant. Offsets are a second type of emission credit which is usually generated by projects or programs outside of the cap to reduce emissions. These credits are typically fungible with allowances – one offset credit can be used as one allowance or a fraction of one allowance.

Regulated emitters reduce their emissions or buy these allowances and offsets to fulfill emission limits mandated by the government. The regulated entities or sources report on each unit of emissions they produce and match all emissions with allowances. The reported total must not exceed the volume allowed for the whole system. If firms do not have enough allowances or offsets to cover all of their own emissions, then they must pay a fine or other sanctions. The basic components of a cap-and-trade system for CO2 are as follows:

- **Cap**: A regulating body, usually national legislations, 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 GHGs, such as methane, are converted to tCO2 according to their global warming potential in relation to CO2.

- **Trade**: One allowance is usually 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.

The goal of cap-and-trade systems is to promote cost-effective reductions in emissions though trading, and incentivize technological innovation around less carbon-intensive sources of energy.

## What is an offset and what role do offsets play in carbon markets?

An offset is an emission reduction that takes place outside of regulated sectors and is credited as an emission reduction within a cap-and-trade system. 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, although each cap-and-trade system determines its own standards and eligibility rules. Non-conservation-oriented projects such as renewable energy generation, capture and combustion of methane from landfills and coal mines, and agricultural manure management are eligible to generate offsets in many cases.

Some advantages of allowing offset credits into carbon markets include:

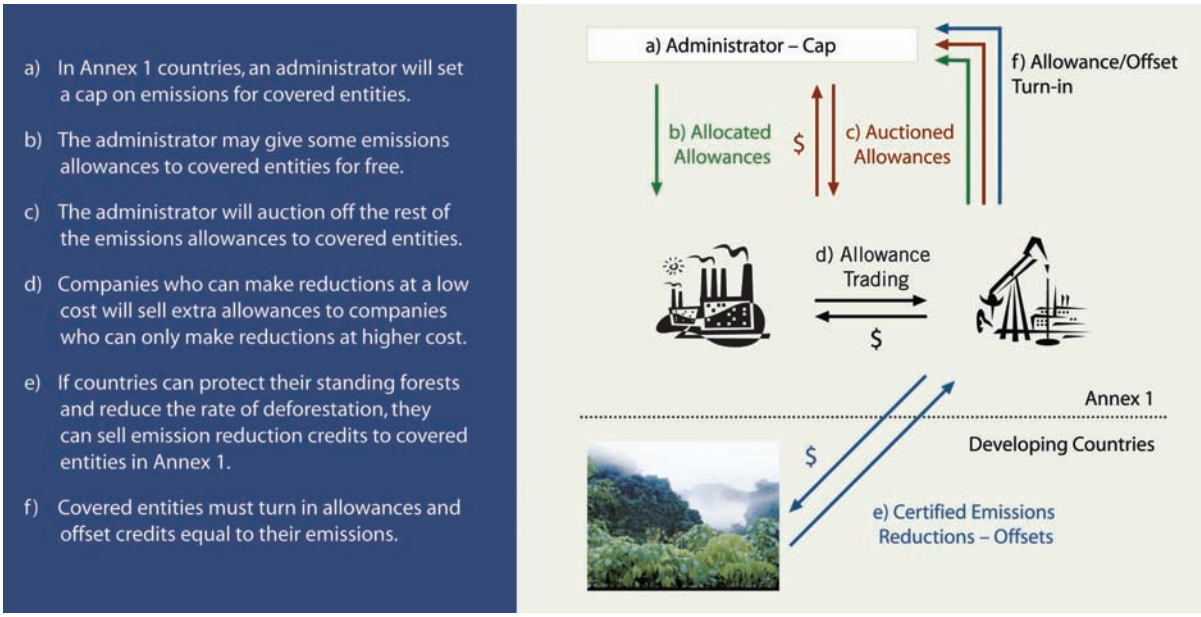
- Offsets promote emissions reductions activities in sectors that do not fall under an emissions cap. Without a market for offsets, there would be limited incentives for those sectors to implement activities that reduce emissions.
- Offsets may reduce the overall cost of compliance, therefore allowing 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.
- Encourage international participation in climate mitigation efforts since many poor developing countries cannot afford or are not obligated to reduce emissions from their own industrial sectors

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 may send money overseas, which is often politically unfavorable.
- Unless accompanied by more stringent caps, offsets can reduce the amount of emissions reductions a firm must generate on-site if credits are cheaper and limits are not placed on their use.

Emissions reductions generated from avoided deforestation activities in developing countries are one possible type of offset. For the most part offsets originate from energy, efficiency, agricultural and forestry projects. Figure 28 illustrates how REDD+ could interact with a carbon market.

**Figure 28**: Simplistic Cap-and-trade Diagram




## What carbon markets are currently in place?

Since the adoption of the Kyoto Protocol in 1997, several carbon markets have developed. A summary of these markets is provided below.

### 1) Kyoto Protocol: Market Mechanism Provisions

The Kyoto Protocol established rules for **International Emissions Trading (IET)** allowing Annex I countries to trade assigned amount units (AAUs) with each other to meet their GHG reduction targets of the Kyoto Protocol. Although countries can set up independent trading mechanisms, the IET permits these countries to follow standardized rules, register and track the exchange of allowances and credits in an international framework, and ensure that ongoing domestic efforts remain consistent with international reporting. At the moment, the EU operates a regional emission trading system in which allowances and credits are tracked in parallel through a system of international registries. This includes offsets and allowances.

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 emission reduction credits that can be transferred to 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 obtain offsets generated by activities implemented in a developing nation that is a party to the Kyoto Protocol. The acquiring Annex I nation may then use those offsets to meet emission targets under the Protocol.

The Kyoto mechanisms were created to stimulate sustainable development through technology transfer and investment, help countries with 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.

**2) Regional or state-level markets**

**The European Union Emissions Trading Scheme (EU ETS)** 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.

The EU ETS was launched in 2003 as a regional pilot for global carbon markets during its Phase I (2005-2007) with 12,000 installations, covering approximately 45% of EU CO2 emissions in the sectors such as energy, manufacturing (steel, cement, glass and others), and pulp and paper.[73] In Phase II (2008-2012), the membership was expanded, targets were adjusted to meet future mitigation goals, and the sectoral coverage was broadened.[74] From 2012 on (Phase III), European regulators (the EU Commission) will centrally set national caps to ensure the overall environmental integrity and ambition of the system. Phase III will also limit the use of offsets and authorizes the EU Commission to define qualitative and quantitative limitations for the use of offsets.

The EU has 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. The EU Commission and a number of member states remain strictly opposed to allowing forestry offsets as carbon market compliance tool.

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 is expected to 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. The states have capped CO2 emissions from the power sector to achieve a 10 percent reduction by 2018. The agreement mandates 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 first compliance period began January 1, 2009.

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.

[73] http://www.ji-cdm-austria.at/en/portal/kyotoandclimatechange/kyotoprotocol/flexiblemechanisms/iet/
[74] http://www.decc.gov.uk/en/content/cms/what_we_do/change_energy/tackling_clima/emissions/eu_ets/euets_phase_ii/euets_phase_ii.aspx

**2) Voluntary Markets**

The two largest markets or exchanges for voluntary offsets today are the Chicago Climate Exchange and the 'over-the-counter' (OTC) market.

The **Chicago Climate Exchange (CCX)** is a voluntary cap-and-trade system (and electronic exchange) in which companies agree to assume legal requirements to reduc emissions. The CCX allows members who take on these commitments to trade with one another, and to purchase offsets from projects developed outside the membership cap.

The over-the-counter (OTC) market for carbon offsets, by comparison, is comprised of individual trades between sellers, buyers and brokers. Heightened public awareness of climate change has greatly increased participation in this market which has developed alongside regulatory markets. Many sources of GHG emissions, such as travel, household activities and special events, are not generally addressed by existing policy instruments and can be mitigated through offset purchases on the OTC markets.

Participants in the OTC market include companies, governments, organizations, organizers of international events, and individuals, all of whom 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 at somewhat higher prices. There are more than 200 carbon offset retailers, aggregators, brokers, registries and exchanges, most of them based in Europe, the U.S., and Australia.75 Prices for OTC credits in 2008 ranged from US$1.20 to US$46.90/tCO2e with renewable energy projects and biomass energy registering the highest average price (US$16.84/tCO2e). Forest projects were generally in the middle price range including projects such as avoided deforestation (US$6.3/tCO2e), forest management (US$7.7/tCO2e), and afforestation/reforestation (US$6.3/tCO2e or US$7.5/tCO2e for plantations and conservation reforestation respectively).[76]

The market is largely 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 20,000 tCO2e annually are considered less attractive in the regulatory CDM market, such projects are more common in the voluntary market where 17% of projects fell into this category, and 41% were generated less than 100,000 tCO2e per year. The voluntary market therefore effectively creates market opportunities for small-scale projects that would otherwise not exist. In addition, forestry projects, a tiny fraction of most compliance markets, make up a significant share of the voluntary market – about 11% of the OTC transaction volume, equivalent to 15.3 MtCO2 of forestry offsets.[77]

The table below provides a summary of total transacted volumes and values of offsets from both the voluntary and regulatory carbon markets.

[75] Hamilton, K., Sjardin, M., Shapiro, A., Marcello, T., 2009, State of the Voluntary Carbon Markets 2009, Ecosystem Marketplace, New Carbon Finance.
[76] Ibid.
[77] Ibid.

**Table 10**: Carbon markets summary[78]

| Markets | Volume $(MtC)_2e$) | | Value (US$ million) | |
|---|---|---|---|---|
| | 2007 | 2008 | 2007 | 2008 |
| Voluntary OTC | 43.1 | 54.0 | 262.9 | 396.7 |
| CCX | 22.9 | 69.2 | 72.4 | 306.7 |
| Other exchanges | 0 | 0.2 | 0 | 1.3 |
| Total Voluntary Markets | 66.0 | 123.4 | 335.3 | 704.8 |
| EU ETS | 2,061.0 | 2,982.0 | 50,097.0 | 94,971.7 |
| Primary CDM | 551.0 | 400.3 | 7,426.0 | 6,118.2 |
| Secondary CDM | 240.0 | 622.4 | 5,451.0 | 15.584.5 |
| Joint Implementation | 41.0 | 20.0 | 499.0 | 294.0 |
| Kyoto (AAU) | 0.0 | 16.0 | 0.0 | 177.1 |
| New South Wales | 25.0 | 30.6 | 224.0 | 151.9 |
| RGGI | - | 71.5 | - | 253.5 |
| Alberta's SGER | 1.5 | 3.3 | 13.7 | 31.3 |
| Total Regulated Markets | 2,919.5 | 4,146.1 | 63,710.7 | 117,582.2 |
| Total Global Markets | 2,985.5 | 4,269.5 | 64,046.0 | 118,287.0 |

## How do existing carbon markets treat forest carbon?

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: reference level 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. The table below lists eligibility of emissions reductions from a range of forest sector activities.

[78] Ibid.

**Table 11**: 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 | | |

Various standards exist to regulate the quality of credits that flow into carbon markets. These standards are discussed in section 5.2.

# SECTION 4

## NATIONAL APPROACHES TO REDD+

**4.1 National REDD+ Basics**
**4.2 National REDD+ Case Study**

## 4.1 NATIONAL REDD+ BASICS

As discussed in previous sections, there are various scales at which strategies can be developed for REDD+, carbon accounting can place, and incentives can be granted. This section explores a national approach to REDD+. A number of countries have begun to prepare national REDD+ programs. However, to date, no country has finalized its program. Therefore, this section draws upon information from national programs in their early stages.

National approaches to REDD+ could also encompass a nested approach, as described above. A nested approach would utilize a national carbon accounting framework to determine the level of incentives that would flow to the country as a whole, but would also utilize sub-national accounting systems to allocate a certain amount of incentives directly to sub-national actors. A nested approach is therefore somewhat like a benefit-sharing mechanism within a national approach. Each country could choose to adopt a nested approach or could simply choose a purely national approach and allocate benefits to sub-national actors through a different mechanism.

There are three main elements of a national approach to REDD+: strategies, carbon accounting frameworks, and monitoring systems. This section will examine each of these areas in turn.

Recent political discussions within the UNFCCC have focused on national-level approaches to REDD+. Many countries 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 the drivers of 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 reference emission level (and/or reference level) 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.

One source of information about national approaches to REDD+ which are currently in their initial stages 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.

**National Accounting**: National accounting already occurs on some level by developed and developing countries through forest inventories, including historic levels of deforestation and degradation, reported to the UNFCCC. Developed country signatories of the Kyoto Protocol must make annual reports about emission from deforestation, with the option to report on sustainable forest management and other land use activities. Developing countries may also issue estimates of these emissions (or sequestration), although these are voluntary and relatively infrequent. Finally, the United Nations Food and Agriculture Organization (FAO) carries out a voluntary global forest carbon inventory that is frequently cited in international negotiations.

For a REDD+ framework, a national government would need to implement a comprehensive national accounting system to inform its national reference level. The national reference level would likely be 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.

Incentives would be allocated to the national government based on performance against this national reference level. National approaches do not necessarily imply that implementation of emissions reductions strategies would need to occur at the national level, but does require that rigorous accounting methods are applied according to standards set in a future international agreement on REDD+ and/or in future bilateral agreements the country may enter into with investor countries.

**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+.

Some examples of REDD+ activities that countries may include in their REDD+ strategies are:[79]

- Retiring logging concessions or clearance rights
- Enhancing protection or management of forest areas
- Investments in forest management and alternative livelihoods
- Relocation of planned infrastructure development and or clearance
- Reallocation of forest land for conservation in place of agriculture
- Policy reforms around national infrastructure and development priorities
- Altering tax policy and/or subsidies for land ownership, investments and land use activities such as agriculture
- Expansion or creation of new protected areas
- Community forests or indigenous reserves
- Land tenure reform
- Reduced impact logging
- Wildfire prevention and forest monitoring
- Payment for environmental services

**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.

**National Registry**: Though the FCPF does not consider the establishment of a national registry as a key element of national readiness, a registry is useful for national approaches to REDD+. National (and ultimately international) registries are critical to any system of emissions trading whether it is a domestic cap-and-trade regime, voluntary transaction or international trading linked to the Kyoto Protocol. Registries are usually electronic databases that register, track and hold individual credits (or recognized emission reductions) enabling the transfer between sellers and buyers.
This ensures accurate accounting of the issuance, holding, transfer, acquisition, cancellation and

[79] Angelsen, A., Brown S., Loisel C., Peskett L., Streck C., Zarin D., 2009, Reducing emissions from deforestation and forest degradation (REDD): An Options Assessment Report, Meridian Institute, Washington, DC, USA

retirement of all credits in a trading system. This may occur on the domestic or international level. At the moment, existing registries include National Registries linked to Kyoto Protocol commitments, the CDM Registry, the UNFCCC Independent Transaction Log, as well as private-sector registries such as the Market Environmental Registry.

Some countries have submitted proposals to the FCPF that provide details on their REDD+ plans. These proposals provide some good examples for how certain countries plan to get ready for their national-level REDD+ program. These proposals can be found at: http://www.forestcarbonpartnership.org/fcp/.

## 4.2 NATIONAL REDD+ CASE STUDY

As a country with the third largest tropical forest in the world, Indonesia's forestry sector contributes not only to national development, it also plays a significant role in maintaining ecosystem balance and stabilizing global emission through avoided deforestation. Indonesia has formulated a national REDD strategy for readiness to:

- provide guidance concerning policy intervention required in the effort to address drivers of deforestation and forest degradation, and the infrastructures which must be prepared in implementing REDD/REDD+
- integrate all actions related to REDD/REDD+ including the activities funded by foreign sources
- include methodology and policy aspects
- support activities such as capacity building and communications with stakeholders
- implement demonstration activities
- form a part of the strategy and efforts of Indonesia to achieve sustainable management of forest for long-term sustainable development

The REDD+ process in Indonesia is being developed in three phases. The preparation phase was completed between 2007 -2008 and resulting in a national strategy and legal reforms. The next phase, readiness (2009-2012), includes preparation of methodologies (establishment of REL/RL, carbon accounting, MRV system) and policy frameworks (policies, institutional setting, funding and incentive distribution mechanism, stakeholder participation) for REDD implementation (capacity building and demonstration activities).

The progress so far includes:

- *Regulation*
  Indonesia issued a regulation on the implementation of REDD demonstration activities and a decree on Forestry Working Group on Climate Change/WG-FCC. These regulations were intended to respond to the high interest from both international partners and national stakeholders to participate in REDD activities, as well as to exercise outcomes of COP/SBSTA processes on REDD.

- *Methodology*
  Indonesia has developed the Forest Resource Information System (FRIS) and the Indonesia National carbon Accounting System (INCAS). INCAS is an integrated system applying all data from LULUCF or AFOLU, to obtain the full profile of the Greenhouse Gas, using remote sensing data, data on land and forest management, land and climate data, and plant growth and biomass data.

- *International cooperation*
  Indonesia participated in two cooperative initiatives requiring intensive coordination with the Forest Carbon Partnership Facility (FCPF) and UN-REDD. There are several activities under both programs which support readiness at the national level including activities related to the establishment of REL and development of MRV system.

The final phase is **full implementation**. This includes activities at the sub-national level with further integration to the national accounting and at national level. The scope of the full implementation will be designed according to the rules and procedures that are being decided at the COP-16, when REDD/REDD+ is expected to become part of a post-2012 agreement under the UNFCCC.

At the same time, in line with policies to address current and future challenges in the forestry sector, Indonesia has intensively worked on building a regulatory framework to tackle deforestation and forest degradation. The achievements so far include:

- Controlling corruption to improve management and governance performance
- Implementation of a program to curb illegal logging through the development Forest Law Enforcement National Strategy (FLENS)
- Regulations on opportunities of access improvement and rights on forest resources as a part of the effort to handle the drivers of unplanned deforestation.

# SECTION 5

## PROJECT LEVEL APPROACH

## 5.1 REDD+ PROJECT LIFE CYCLE

Many demonstration activities for REDD+ are currently underway at the project-level. These activities can provide useful lessons for scaling REDD+ up to large scales. This section provides information on REDD+ projects.

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.

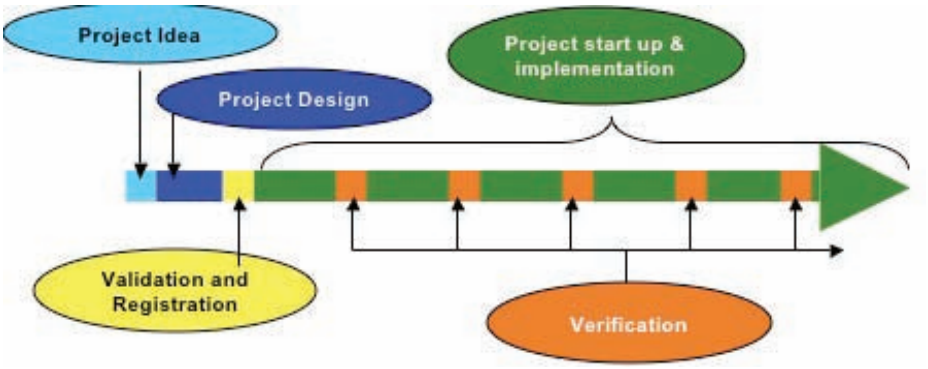
Key phases in project development
There are five key phases in the development of forest carbon projects:

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 29**: 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 US$7,000-US$40,000.The project performance must also be monitored for future verification.

## 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
- The 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.

## 5.2 STANDARDS AND VERIFICATION OF 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:

- Requirement for measurement, monitoring and verification
- Establishment of credible reference emission level or baseline
- Credit issuance depends on independent third-party evaluation of the project for accreditation, validation and verification through transparent process with a public comment period
- Impact assessment on communities and environment
- Addressing permanence, leakage, additionality and risk
- Compliance with appropriate laws and regulations

Although credits from REDD+ are not currently accepted in the regulatory markets, numerous standards and certifications exist in the voluntary carbon market of which only two appear to broadly applicable to REDD+ projects worldwide. 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.

The second, a certification known as the Climate, Community & Biodiversity Standards (CCBS), was designed to demonstrate additional social and environmental benefits in forest and land use projects. This is a certification, rather than a standard, as it does not prescribe a certain methodology (or project blueprint) for the REDD+ activity. Instead, it certifies project characteristics meet certain criteria. 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.

A full summary of the carbon standards including REDD+ and/or forestry is below.

**Figure 30**: Summary of major GHG offset standards

| Standard | Re-forestation | Improved Forest Management | Agro-forestry | REDD | Other LULUCF | Carbon Credits | Use of Standards in 2009 |
|---|---|---|---|---|---|---|---|
| **Climate, Community and Biodiversity Standards**[1] | √ | √ | √ | √ | √ | ----- | 40% |
| **CCV** | √ | √ | √ | √ | √ | Ex-post | --- |
| | √ | ----- | √ | ----- | ----- | Ex-ante | Not specified |
| **CarbonFix Standard** | | | | | | | |
| **Plan Vivo** | √ | √ | √ | √ | ----- | Ex-ante Ex-post[2] | 6% |
| **Voluntary Carbon Standards AFOLU**[3] | √ | √ | √ | √ | ----- | Ex-post | 37% |
| **Climate Action Reserve** | √ | √ | √ | √ | ----- | Ex-post | 4% |
| **CDM** | √ | ----- | √ | ----- | √ | Ex-post | Not specified |

Sources: Canterbury, 2008, Forestry Carbon Standards 2008, p. 17 and Ecosystem Marketplace, 2009, State of the Forest Carbon Markets 2009, p. 35

If REDD+ is adopted under the UNFCCC or other regulatory frameworks, additional standards will likely 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.

## 5.3: PROJECT CASE STUDY

# Noel Kempff Mercado Climate Action Project: A case study in reducing emissions from deforestation and degradation

**Acronyms**

| | |
|---|---|
| AEP: | American Electric Power |
| APOCOM: | Apoyo Comunitario (Program for the Sustainable Development of Local Communities) |
| BAU: | Business as Usual |
| CAR: | Corrective Action Request |
| CCB: | Climate, Community and Biodiversity standard |
| CDM: | Clean Development Mechanism |
| CIBAPA: | Central Indígena Bajo Paraguá (Bajo Paragua Indigenous Organization) |
| FAN: | Fundación Amigos de la Naturaleza (Foundation for Friends of Nature) |
| FAO: | Food and Agriculture Organization |
| GOB: | Government of Bolivia |
| INRA: | Instituto Nacional de Reforma Agraria (National Agrarian Reform Institute) |
| NK-CAP: | Noel Kempff Mercado Climate Action Project |
| NKMNP: | Noel Kempff Mercado National Park |
| PDD: | Project Design Document |
| PIP: | Plan Integral de la Protección (Integral Plan of Protection) |
| PRODECOM: | Programa de Desarrollo Comunitario (Community Development Program) |
| REDD: | Reducing Emissions from Deforestation and Degradation |
| SCP: | Site Conservation Plan |
| SERNAP: | Servicio Nacional de Áreas Protegidas (National Protected Area Service) |
| SGS: | Société Générale de Surveillance (General Society of Monitoring) |
| tCO2e : | Metric tons of carbon dioxide equivalent |
| TNC: | The Nature Conservancy |
| UNFCCC: | United Nations Framework Convention on Climate Change |
| USIJI: | United States Initiative on Joint Implementation |
| VERs: | Verified Emissions Reductions |

**Conversions**

1 hectare (ha) = 2.47 acres (ac)
1 metric ton of carbon dioxide equivalent (tCO2e) = 44/12 metric tons carbon (tC)
1 metric ton = 1,000 kilograms (kg) = 2,205 pounds (lb) = 1.10 short (U.S.) tons

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## 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 added to the original national park. 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.

NK-CAP was one of the world's first large-scale Reducing Emissions from Deforestation and Degradation ("REDD") projects, and is addressing the drivers of both Ds 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.

As an early-stage REDD project, there were no precedents for the Noel Kempff Climate Action Project to follow. Instead, it was necessary to create new and innovative methods to address scientific, institutional and legal issues associated with REDD projects. Since NK-CAP was initiated, the forest carbon field has advanced in important ways. Remote sensing technology, for example, has facilitated the development of more robust carbon accounting and monitoring. With the benefit of hindsight, it is possible to identify other areas in which the project could be improved, utilizing methodologies, legal arrangements, and conservation tools that were not readily available at the time.

NK-CAP, nonetheless, serves as an example of how well-designed REDD projects can result in real, scientifically measurable, and verifiable emissions reductions with important benefits for biodiversity and local communities. Specifically, NK-CAP has produced the following results:

- Avoided 1,034,107 metric tons of verified 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 CO2 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 and ecotourism;
- 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.

## PARTNERS AND CONTRIBUTORS

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

| | |
|---|---|
| Project Development | The Nature Conservancy (TNC), Fundación Amigos de la Naturaleza (FAN) |
| Project Management | Fundación Amigos de la Naturaleza (FAN) |

| | |
|---|---|
| Project Investors | American Electric Power Company (AEP), BP America, PacifiCorp |
| Country Partner | Government of Bolivia (GOB) |
| Carbon Measurement | Winrock International Institute for Agricultural Development, Fundación Amigos de la Naturaleza (FAN)[80] |
| Validation and Verification | Société Générale de Surveillance (SGS) |

## PROJECT OVERVIEW

### 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 (Figure 1). 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 wetter Amazonian and the drier Chaco and Cerrado eco-regions, the park was considered one of the most biologically diverse areas of the world.

### Project 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 its natural boundaries: 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.

*Figure 1: NKMNP - in rose. Source: GIS data from FAN, cartography N. Virgilio.*

Between 1996 and 1997, the project 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 2). Additionally, the Paragua II concession was closed, as no legal concession title existed.

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 hectares of forest that had been degraded by former logging activities, was slated for future logging or predicted to be deforested.[81] 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 2).

### 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. To this end, project funds were used to hire 11 of the 27 park rangers. New rangers' camps have also been built, and equipment has been provided, as have the

[80] 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.
[81] 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.

necessary provisions (fuel, food) to carry out the monitoring activities. In 2008, for example, 664 river patrols, 9 airborne patrols, and 4 field monitoring trips were executed.

Remote sensing technology has been used to complement field monitoring. 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 due to flooding of the Paragua River and 17.5 hectares of land have been deforested near the community of Bella Vista. These events were factored into and subtracted from the estimation of project carbon benefits (see "Carbon Benefits" section for more information).

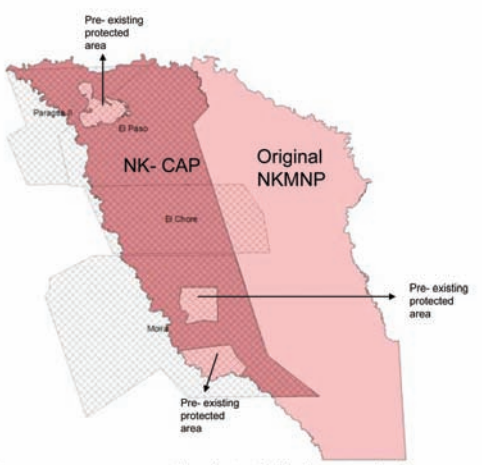

*Figure 2: Current NKMNP boundaries include the entire colored area. Former timber concessions are depicted in cross-hatch. Source: GIS data from FAN, cartography N. Virgilio.*

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. Using this history of fire occurrence to derive a rate of loss from fires, estimated carbon benefits from reducing deforestation 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 three energy companies: American Electric Power Company (AEP), BP America, and PacifiCorp (see Figure 3). In return, they were guaranteed 51 percent of future certified offsets created over the 30-year project lifetime. These investors assumed the risk that the estimated quantity of verified carbon benefits might not be fully realized. The Government of Bolivia pledged support for the project plan, closed the timber concessions, expanded the park, and received 49 percent of the carbon benefits, which it agreed to use to fund community development, park management and other activities.

### Deal Structure

Funds from The Nature Conservancy (TNC), American Electric Power (AEP), PacifiCorp, and BP America, as well as returns on the initial investment, are distributed by TNC to project partner Fundación Amigos de la Naturaleza (FAN). Project implementation costs include: the purchase and retiring of logging concessions, community development, carbon accounting, park management and protection (see Figure 4 and Figure 5).[82]

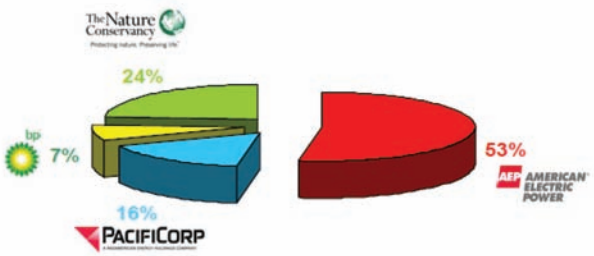

*Figure 3: Breakdown of investor contributions from 1997-2006. Total: $10.85 million. Source: FAN.*

### Endowment Fund

An endowment fund was created to finance

[82] In 2007, the Bolivian Tax Administration proposed that the investors' share of the carbon offsets may be subject to tax obligations under Bolivian law; the financial implications of this tax obligation were unclear as of this writing. Given the pilot nature of NK-CAP, there were no precedents for forest carbon projects and tax obligations were not anticipated within the NK-CAP project structure or budget. The NK-CAP project experience highlights the need to anticipate, to the extent possible, any tax or other legal obligations during project design.

long-term monitoring and protection of the park. The fund was initially begun with $1.5 million. As of 2006, it had expanded to 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.

After the project concludes in 2026, it is anticipated that the endowment will have funds remaining, which will be used for long-term benefit of the park.

**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. The government agreed to earmark proceeds from the sale of it share of the offsets in the following manner: 31 percent for the protection of the park, 10 percent for the national system of protected areas, and 59 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. Specific allocations of this 59 percent were not negotiated upfront and communities in the vicinity of Noel Kempff Mercado National Park are currently negotiating with the Bolivian Government to define their share. As of this writing, the Bolivian government had not yet sold its share of the verified emission reductions (VERs).

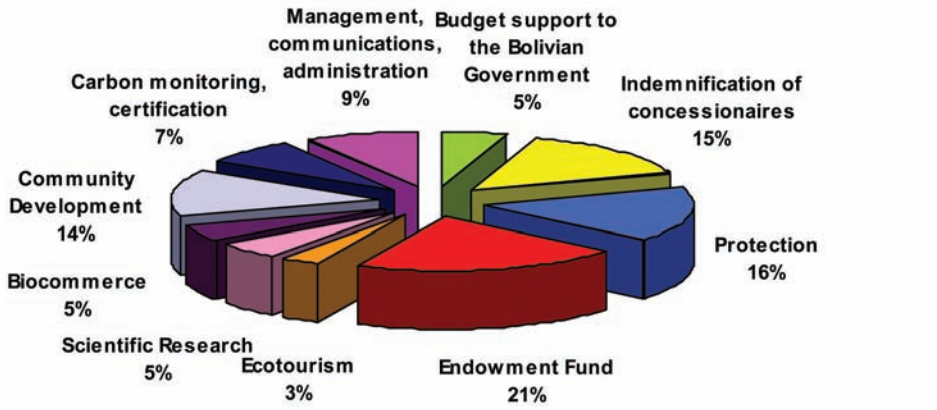


*Figure 4: Project spending from 1997- 2006 totaled $11.55 million. Please note, expenditure is greater than initial funding due to returns on the initial investment over time. Source: FAN.*

**Offset Cost**

While investor contributions to NK-CAP were not structured on a per-ton basis, the cost of implementing NK-CAP, in 2009 dollars, has been estimated at $18 per metric ton of CO2e. This estimate was based on an analysis of project financials, and several key assumptions, including: that 20% of the carbon benefits would be retained in a permanence buffer, that offsets from the project would be generated and sold at routine intervals, and that investors would seek a reasonable rate of return on the project.

Under the carbon accounting standards in place at the time NK-CAP was initiated and underwent its first verification, only a 5% permanence buffer was retained from the avoided deforestation component. Given the evolution of carbon accounting standards, the conservative assumption was made that 20% of carbon offsets would need to be reserved to comply with current standards, such as the Voluntary Carbon

Standard. Likewise, although the first NK-CAP project verification occurred in 2005, and no offsets from the project had been sold at the time of publication, the assumption was made, based upon typical practice in the market, that offsets would be verified and sold periodically (i.e., usually every five years).[83]

Finally, the analysis considers the project's expenses (historic and projected, capital and operating) and projected revenue from the sale of verified offsets, regardless of which parties bear the costs, or to whom the offset rights and revenue accrues. A nominal discount rate of 15% was assumed as a reasonable rate of return on the project, based upon various benchmarks. The results are particularly sensitive to the discount rate used: while a 15% discount rate yields an estimate of $18 / tCO2e, applying a 13% or 17% discount rate results in estimates of $15 and $22 per ton of CO2e, respectively.

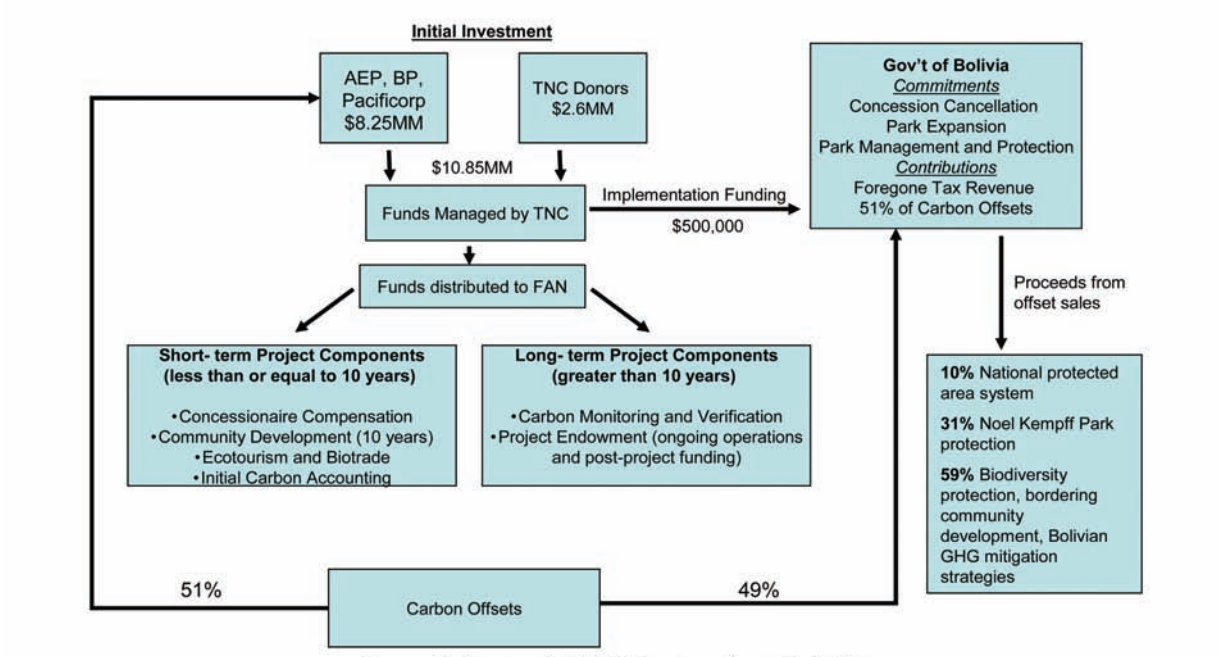


*Figure 5: Deal structure for NK-CAP partners. Source: G. Fishbein.*

[4] Offsets generated from 1997-2000 were assumed to be verified and sold in 2001. A sale in 2006 of 2001-2005 offsets was assumed, and so on for five year periods, with a final sale in 2027 of offsets from 2021-2026.

## Carbon Benefits

Carbon benefits resulting from REDD project activities are calculated as the difference between emissions from the without-project scenario (known as the baseline- see Figure 6) and emissions from the with-project scenario, minus any deductions for leakage, uncertainty and impermanence risk. Carbon benefits for a particular verification period are calculated ex-post, using actual data from the period in question. The carbon benefits achieved between 1997- 2005 by the Noel Kempff Mercado Climate Action Project were verified by Société Générale de Surveillance ("SGS") 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.

[83] Offsets generated from 1997-2000 were assumed to be verified and sold in 2001. A sale in 2006 of 2001-2005 offsets was assumed, and so on for five year periods, with a final sale in 2027 of offsets from 2021-2026.

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 land use change model (called GEOMOD - 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 characteristics. As a result of the project, 763 ha were saved over the 1997-2005 verification period, corresponding to 371,650 tCO2e.

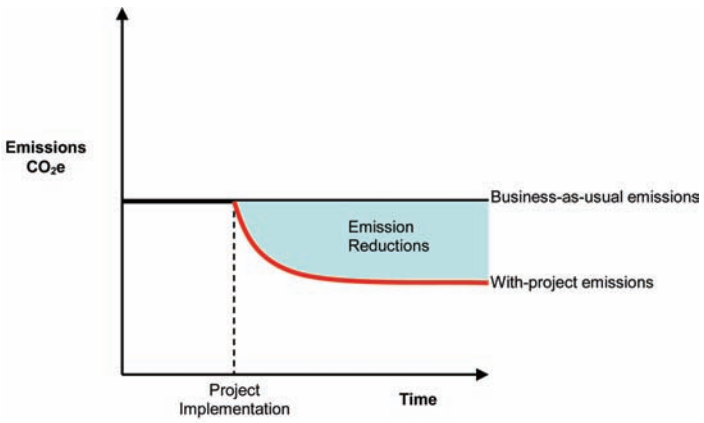


*Figure 6: Generic illustration of carbon benefits (emission reductions) from project activities. Source: N. Virgilio.*

**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 emissions of 791,443 tCO2e. The baseline harvest was modeled using an advanced statistical model of the Bolivian timber market (see "Baseline" section for a detailed description), simulating domestic/international timber supply and demand at different scales: national, regional, and project level.[84]

As a result of both activities, the project generated a total carbon benefit of 1,034,107 tCO2e over the 1997- 2005 verification period. The annual breakdown of these benefits is shown in Figure 7.

| | A | B | C | D = A+B-C | E | F = D-E |
|---|---|---|---|---|---|---|
| Year | Emissions Avoided from Deforestation (tCO2) | Emissions Avoided from Degradation (tCO2) | Leakage Deduction (tCO2) | Total Carbon Offsets (tCO2) | Emissions from Project Activities* (tCO2) | Net Carbon Offsets (tCO2) |
| **1997** | 56,401 | 48,180 | 7,264 | 97,317 | 169 | 97,148 |
| **1998** | 40,304 | 59,374 | 9,141 | 90,539 | 211 | 90,328 |
| **1999** | 39,783 | 69,931 | 10,960 | 98,753 | 282 | 98,472 |
| **2000** | 43,417 | 79,889 | 12,731 | 110,578 | 204 | 110,373 |
| **2001** | 41,158 | 89,298 | 14,454 | 116,003 | 167 | 115,836 |
| **2002** | 40,238 | 98,190 | 16,130 | 122,298 | 132 | 122,166 |
| **2003** | 33,972 | 107,081 | 17,589 | 123,462 | 109 | 123,353 |
| **2004** | 31,684 | 115,632 | 18,971 | 128,347 | 102 | 128,244 |
| **2005** | 44,693 | 123,867 | 20,277 | 148,282 | 96 | 148,186 |
| **Total** | 371,650 | 791,443 | 127,516 | 1,035,578 | 1472 | 1,034,107 |

* from transportation fuel use, etc.

*Figure 7: Verified carbon benefits generated by NK-CAP. Source: Noel Kempff PDD.*

[5] 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.

[84] 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.

**Estimated Lifetime Carbon Benefits**
The total carbon benefits from NK-CAP are expected to reach 5,838,813 tCO2e 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 baselines, reflect the pioneering nature of the project, which broke ground on methodologies for estimating baselines.

As a result of methodological advances, anticipated lifetime carbon benefits were ratcheted down from the initial approximation of 53,190,151 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, local field measurements and advanced statistical models, which are more robust and accurate. Estimated lifetime carbon benefits are just that – estimates. Although these forward-looking estimates may change over time, verified carbon benefits, based on backward-looking observations of the verification period in question (in this case, every 5 years) will not change. Only at the end of the 30 year project will it be possible to know the total lifetime carbon benefits of NK-CAP.

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 and the "History of Project Baselines" section for more on changes to the estimated lifetime carbon benefits.

## ADDITIONALITY

A fundamental challenge for all REDD projects is to demonstrate "additionality." Additionality refers to the amount of carbon dioxide captured, stored or prevented from reaching the atmosphere compared to what would happen under business as usual practices. Additionality is an important concept to ensure that the claimed benefits from a carbon project are above and beyond what would have happened anyway.

Since additionality involves assessing what would have (but did not) happen, it cannot be measured exactly and is often subjective. Nevertheless, there are several suggested tests for determining whether emission reductions are additional, specifically: Were project activities required and regularly enforced by law? Would project activities have been financially possible otherwise? Were the project activities common practice? Were business-as-usual ("BAU") emissions the same or lower than the with-project scenario? An answer of "no" to all four questions helps to establish additionality.

NK-CAP met these tests of additionality on all four grounds. The project 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. Finally, the NK-CAP with-project scenario resulted in fewer emissions than the baseline scenario.

**Baseline**
A project baseline is the "without-project" or business-as-usual (BAU) scenario; simply put, the prediction

of what would have happened had the project not taken place. As was discussed in the "Carbon Benefits" section, the methods used in determining baselines greatly influence both the magnitude and accuracy of carbon benefits, which are calculated as the difference between the baseline and "with-project" scenario. It is very important for baselines to be monitored over time and corrections to be made for situations such as changes in policy, governance, deforestation rates, and socio-economic conditions.

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- it was necessary to treat each component separately in the calculation of the project baseline. Since NK-CAP was the first forest carbon project of its kind, it was necessary for the project to create its own methodologies for calculating baselines. As such, both baselines have been re-estimated several times since the project began, as new information, refined methods and advanced technology became available, increasing the accuracy with each revision (see "History of Project Baselines" section for more detail). Some voluntary standards require that baselines be monitored and re-evaluated periodically, to make adjustments for possible changes in external factors that could influence land use practices. Moving forward, it is planned that the project baseline will be reevaluated every 5 years, and adjusted if needed. It is believed that the largest changes to the baselines occurred in the beginning years of the project, when methodologies were still being refined, and future changes will be minimal.

**Avoided Deforestation Baseline**

The creation of an avoided deforestation baseline in NK-CAP required 4 steps: 1) determination of deforestation rates, 2) prediction of likely locations for future deforestation, 3) determination of carbon content in areas predicted to be cleared, and 4) calculation of emissions resulting from anticipated deforestation.

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

While remote sensing technology and models like GEOMOD can estimate areas of forest loss, estimating emissions from that forest loss involves measuring the carbon stocks of the vegetation in the area, since different types of vegetation (e.g., tropical forest vs. temperate forest) contain different amounts of carbon.

In NK-CAP, the areas predicted to be cleared by GEOMOD were assigned one of five vegetation classes (e.g., high evergreen forest) using Landsat imagery and on-the-ground observations. The carbon content of each vegetation class was determined through field research, using time-tested, scientifically-proven techniques such as measurement of tree diameter and soil analysis (Figure 8). To this end, 625 permanent study plots

*Figure 8: Foresters and young men from the local community of Florida work together to measure the boundaries of the forest plots where logging impacts will be measured over 30 years in a forest concession (Cerro Pelado) near Noel Kempff Mercado National Park in Bolivia. Photo credit: © Margo Burnham.*

were established in and around NK-CAP to measure and monitor carbon stocks (Figure 9). All carbon pools – aboveground and belowground biomass, litter, dead wood, and soils to 30 cm depth – were analyzed for their carbon content. Once carbon stocks were determined for each vegetation class, the areas presumed cleared in the baseline scenario were then converted into carbon emissions using established formulas.

**Monitoring the Baseline**

The avoided deforestation baseline will be re-evaluated every 5 years to capture any changes in institutional structure, local deforestation rates, and socioeconomic circumstances that might affect the estimated emissions for the remaining years of the project. A reference area was chosen adjacent to the Park to serve as a "control" for the estimated baseline (Figure 12). This area will be monitored over time using Landsat data 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 Baseline**

The creation of the avoided degradation baseline involved predicting the business-as-usual emissions that would have been caused by the closed timber concessions. Because timber harvesting is impacted by market conditions, the avoided degradation baseline was determined using an econometric model of Bolivian timber markets, developed by Brent Sohngen and Sandra Brown, which predicts the volume of future harvests in Bolivia, both within the project area and the country as a whole (important for leakage analysis), and the carbon impacts of those harvests.

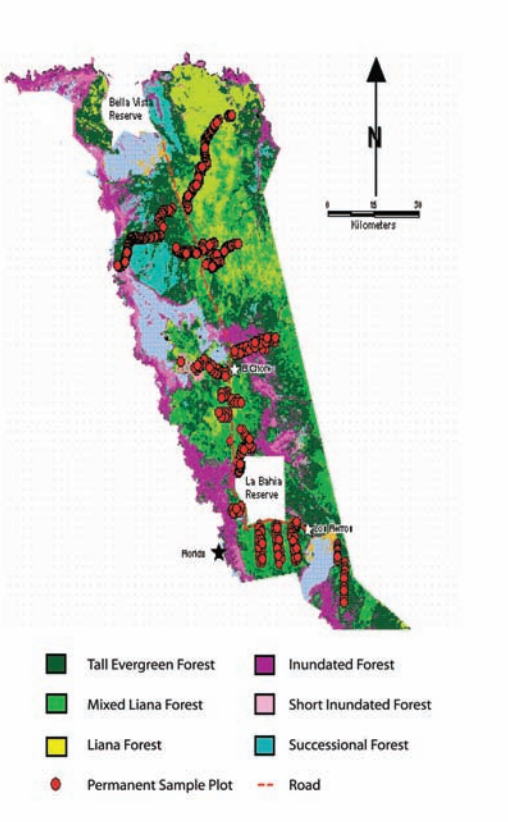


**FIGURE 13** » Map of the Noel Kempff Climate Action Project showing the distribution of the six forest types and the location of the 625 permanent plots. Source: Winrock International.

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. In addition to economic parameters, the model considered many dynamics of timber harvesting activities, including forest characteristics (e.g., wood density), collateral damage due to logging, decomposition of dead wood, carbon storage in dead wood products, and the difference in regrowth between logged and unlogged areas. Aboveground biomass and dead wood were the only carbon pools included in the calculations, as soil carbon and belowground biomass (roots) were not expected to change significantly due to harvesting activities. It is important to note that a 1996 change in Bolivian law, requiring concessionaires to pay a fee per hectare of land, resulted in the reduction of nationwide timber concessions by 75%. However, when analyzed within the timber market model, it was found that this did not result in a significant change in timber output, as concessionaires simply increased harvest intensity on their holdings.

**Monitoring the Baseline**

In order to accurately estimate damage due to logging activities and to detect potential differences in regrowth rates over time between logged and unlogged areas, 102 survey plots (dubbed Carbon Impact Zones or CIZs) were established in the Cerro Pelao logging concession adjacent to the project area. From these plots, it was determined that over time, the difference in regrowth between logged and unlogged areas was not statistically significant. Economic variables for the timber market model (e.g., timber prices, inflation rates) are being monitored annually to every 5 years, depending on the particular parameter.[85]

**History of Project Baselines**

As mentioned in the "Carbon Benefits" section, baselines from both the avoided deforestation and avoided degradation components have been modified several times since the start of the project. As a result of improvements in baseline methodologies and technology, the baselines have been adjusted significantly from their starting points in 1996. The biggest changes to the NK-CAP baselines occurred in the initial years of project implementation, as methodologies were still being perfected. In particular, a change to the timber extraction rate used in the initial avoided degradation baseline drove substantial adjustments in the early years of the project. Plans exist to re-evaluate the project baseline every 5 years as a part of the verification process in order to capture any changes in government, policy, deforestation rates, and socio-economic circumstances that might have occurred over that time period, with the potential to affect the business-as usual scenario for future years.

Although there were several modifications made to the project baseline since the initiation of project activities, the largest adjustments occurred in 1999, 2001 and 2005. In 1999, refinements made to the timber extraction rate and the lying dead wood carbon stock estimate, as well as the introduction of 102 permanent plots in an adjacent concession to measure damages attributable to harvesting activities, led to a decrease of estimated lifetime carbon benefits from 53,190,151 tCO2e to 23,719,919 tCO2e. Most of the decrease was attributable to refined timber extraction rates used in the avoided degradation component baseline, and illustrates the substantial effect this parameter can have on calculations. In 2001, satellite imagery and advanced models employed for the first time in baseline estimation, as well as further refinement of the timber extraction rate, led to a reduction in estimated lifetime carbon benefits to 13,155,079 tCO2e. Again, most of the decrease was associated with the avoided degradation component of the project and was largely due to further refinement of the timber extraction rate. Finally, in 2005, the GEOMOD land use change model employed a more conservative approach to predicting the amount of land to be deforested, using a linear rate of deforestation based on historical trends. Subsequently, estimated lifetime carbon benefits decreased to 5,837,341 tCO2e.

The NK-CAP experience serves as a prime example of the importance of moving away from baseline methodologies founded on surveys and proxy data from other regions/countries, to approaches that rely on field testing, satellite data and site-specific information in the calculations. Since NK-CAP was one of the first large-scale REDD projects to be implemented, there were no precedents for project developers to follow. The experience gained through the NK-CAP baseline methodology development has helped to inform TNC's other projects and has served as a model for projects developed by other organizations, as well as in the development of project standards. For example, the Voluntary Carbon Standard, one of the most well respected standards for the voluntary market, refers to Noel Kempff as an example for many of their methodological recommendations, including baselines.[86]

85 As per SGS's 2005 full verification report for Noel Kempff, pg. 29.

86 VCS. Guidance for Agriculture, Forestry, and other Land Use Projects. November 2008, Washington, D.C. see page 21.

It is important to distinguish estimated lifetime carbon benefits, which are apt to change with each verification, and verified carbon benefits, which are confirmed as the project proceeds. Unlike estimated lifetime carbon benefits, verified benefits are based on backward-looking observations and will not change, regardless of any adjustments made to the baseline(s) for future periods (see Figure 10).

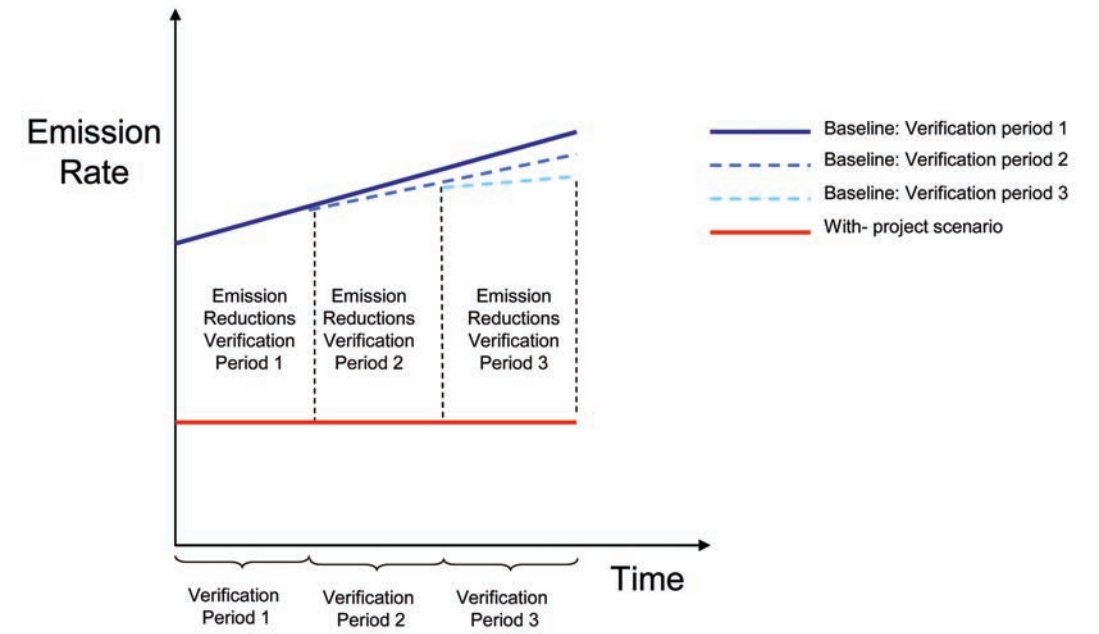


*Figure 10: General illustration of emission reductions over the course of several verification periods. Source: N. Virgilio.*

## LEAKAGE

Leakage comes in two forms: activity-shifting (primary) leakage and market (secondary) leakage. Activity-shifting leakage occurs when a project directly 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 a project changes the supply-and-demand equilibrium, causing other market actors to shift their activities. For example, if a project constrains commodity supply, market prices may rise and other producers may increase their activities in response.

Credible carbon projects must attempt to prevent, analyze the risk of, calculate, compensate for and monitor leakage in order to accurately calculate carbon benefits.

Since it was possible that NK-CAP project activities could displace emissions elsewhere, every attempt was made to quantify potential leakage, while specific safeguards were also built into the project design to 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.

### Avoided Deforestation Leakage

#### Estimation and Prevention of Leakage from Avoided Deforestation Activities

Since the establishment of the project, the largest short-term risk for activity shifting leakage existed from subsistence agricultural expansion by the communities living along the border of the extended park area. As such, the project incorporated extensive leakage prevention activities, in the form of community development programs including: educational campaigns, workshops in sustainable agriculture, assistance in securing legal status and land tenure, and development of a management plan for ancestral lands. See the "Community Benefits" section for detailed information on the program.

Perhaps the most successful aspect of the avoided deforestation leakage prevention program was the legal designation of a 360,565 hectare indigenous ancestral territory ("TCO") for border communities, which officially granted them property rights. Communities helped design the Bajo Paragua Native Communal Land Natural Resources Management Plan for the lands adjacent to the project and sustainable forestry activities undertaken in the TCO are lessening pressure to deforest within project boundaries.

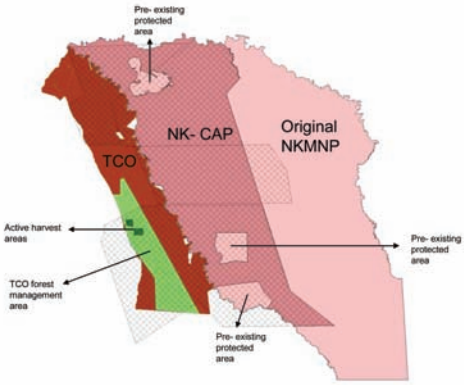


*Figure 11: The sustainable forestry activities carried out by border communities fall almost entirely within the former timber concessions (cross- hatch). Source: GIS data from FAN, Cartography from N. Virgilio.*

As a result of these activities, it was anticipated that there would be no activity-shifting leakage from the avoided deforestation component of the project. Similarly, as the threat of deforestation came from subsistence agricultural expansion and not commercial agricultural expansion, no market leakage was expected.

NOTE: The sustainable harvesting activities occurring in the TCO are NOT being counted as activity-shifting leakage. As the TCO's forestry use lies almost completely inside the area of former timber concessions and outside the NK-CAP area (see Figure 11), these activities do not constitute 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 in the baseline scenario, since previous harvesting activities in the former concessions were more intense and did not operate according to a sustainable management plan.

**Monitoring Leakage from Avoided Deforestation Activities**

Although no leakage was expected from this aspect of NK-CAP, project developers still monitored for any unanticipated activity shifts. The project designed a 15 km control area around the borders of the NK-CAP zone to capture possible activity shifts (see Figure 12). 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 increase from its baseline scenario and the difference between the two would be the leakage. A reference area adjacent to the buffer served as a control for the baseline deforestation rate and any detected leakage would be standardized by changes in overall deforestation rate captured 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, confirming the prediction that no activity-shifting leakage would occur for the avoided deforestation aspect of the project.

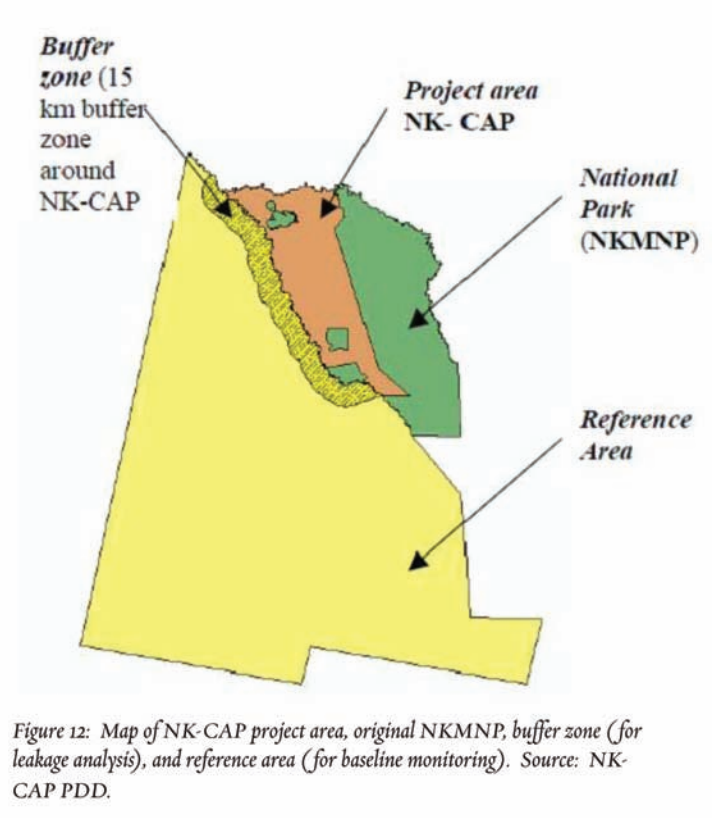


*Figure 12: Map of NK-CAP project area, original NKMNP, buffer zone (for leakage analysis), and reference area (for baseline monitoring). Source: NK-CAP PDD.*

**Avoided Degradation Leakage**

**Estimation and Prevention of Leakage from Avoided Degradation Activities**

The risk of leakage from the avoided degradation component of the project was two-fold: that concessionaires themselves would relocate, but continue their activities elsewhere (so-called activity-shifting leakage) and that the reduction of timber supply caused by closing concessions would affect prices, resulting in increased harvesting elsewhere. The project employed several methods to prevent, quantify and monitor leakage.

The closing of sawmills, and the purchasing and retiring of harvesting equipment from concessionaires by project developers (as part of the overall concession buyout) 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 pressure for concessionaires to shift harvest activities elsewhere by taking away the debt associated with the equipment. Furthermore, it prevented the possibility for equipment to be sold inexpensively to other harvesters when the indemnified concessionaires left the business. As a result of these equipment purchases, as well as expense and activity tracking of the indemnified concessionaires (explained below), it was estimated that there was no risk of activity-shifting leakage from the avoided degradation component of the project.

In estimating potential market leakage from the avoided degradation component of NK-CAP, project developers employed the national timber model developed specifically for Bolivia by Brent Sohngen and Sandra Brown (see “Baseline” section for a detailed description). The model represented a landmark achievement in quantifying leakage on a national scale, particularly important for the scaling up of REDD mechanisms in the future.

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 explored the interdependence between price and demand for timber, as well as upfront cost constraints, resulting in estimates of 14-44% leakage from the avoided degradation component of the project. The higher leakage estimates were for scenarios in which prices are highly sensitive to changes in supply. Because it was determined that timber prices in Bolivia are NOT highly sensitive to supply changes (the country is considered a “price-taker” not “price-setter” on international markets), a final leakage estimate of 16% of avoided emissions from degradation (11% of total project carbon benefits) was used. This totaled 1,012,337 tCO2e for the lifetime of the project, which was subtracted from the emissions reductions from the project, resulting in an estimate of lifetime carbon benefits for the project of 5,838,813 tCO2e. Calculated market leakage from the 1997-2005 verification period totaled 127,515

tCO2e and was subtracted from the verified carbon benefits, resulting in the final number of 1,034,107 tCO2e (see Figure 7).

**Monitoring Leakage from Avoided Degradation Activities**
Although no activity-shifting leakage was estimated from the avoided degradation component of the project, the activities of the concessionaires were tracked 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 the former concessionaires from initiating new logging activities for a period of five years, and allowed FAN to track their activities outside the project area.

FAN closely tracked the expenditures of former concessionaires, most importantly to determine if indemnification 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.

In the case of market leakage, economic variables used in the timber market model to calculate leakage are being monitored periodically.

## PERMANENCE

Permanence refers to how robust a project is to potential changes that could reverse the carbon benefits of the project 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 avoid and safeguard against the risk of impermanence.

First and foremost, it is important that all stakeholder interests (government, communities, business, etc.) are aligned with the long-term project objectives. Specific approaches, such as the purchase of conservation easements, creation of protected areas, community development, establishment of endowments for project management and monitoring, and the use of carbon buffers can also help ensure permanence. 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 in a binding legal document (Supreme Decree #24457), with effective protection under the auspices of the National Service of Protected Areas (SERNAP) and FAN Bolivia as the project administrator.

The Bolivian Government has a financial stake in the project's success and continuity, as it is entitled to 49% of the verified emissions reductions from the project. Through the project, an endowment has been established to fund the protection and management of the expanded Noel Kempff Mercado National Park, including rangers, equipment, and infrastructure to protect the park. It is expected that funds will be left in the endowment when the project's 30-year lifespan comes to completion, and these funds must be used for the benefit of the Noel Kempff Mercado National Park according to the legal endowment fund agreement.

The robust community development aspects of the project are meant to result in long-term conservation by the communities adjacent to the park. Provided with new income opportunities, land tenure and a

sustainable land-use management plan, it is expected that community members will permanently refrain from clearing within park boundaries for subsistence agriculture.

Risk of fire was considered in the calculation of project carbon benefits, using the actual occurrence of fires from 1997-2005. As a result, 5% of the estimated avoided deforestation carbon benefits were deducted as a safeguard against the risk of fire. There are no additional discounts or reserves being held for other types of impermanence risk.

## COMMUNITY BENEFITS

By conserving forests that local people rely on, well-designed REDD projects can provide important ecological, cultural, and economic benefits to communities. Some times, as was the case with Noel Kempff, local communities themselves are responsible for the forest loss that REDD activities aim to prevent. Community development and involvement is often crucial to lessening pressure on forest conversion and obtaining long-term commitment and support for the project. The use of standards such as the Climate Community and Biodiversity (CCB) standard, which supports community involvement in the design of climate change mitigation projects, can help safeguard adequate consideration of community concerns.

*Figure 13: Chiquitano children living in one of the local communities just outside the border of Noel Kempff Mercado National Park in Bolivia. Photo credit: © Hermes Justiniano.*

As of 1996, there were seven communities adjacent to the NKMNP – Florida, Porvenir, Piso Firme, Cachuela, Bella Vista, and Esperancita de la Frontera – with a total population of 1,025. Traditionally, these communities sustained themselves through subsistence agriculture; with women and children in charge of gathering firewood, fruits and medicinal plants, and men seeking income through seasonal work in sawmills, field clearing, hunting and fishing. Men working in sawmills could be expected to earn between $66- $133/month.[88] Prior to project implementation, the communities generally did not have public services; rivers provided water, health centers were in poor condition, roads were seasonally impassable, public transportation was non- existent and schools lacked adequate supplies, space and teachers.

Community development activities undertaken as part of the project, including organizational empowerment, capacity building, improvement of basic services, and development of income generating activities, are likely to result in overall long-term enhancement of livelihoods.[87,88] In 2005, FAN conducted a socioeconomic impact assessment which examined Human Capital, Natural Capital, Physical Capital, and Financial Capital as measurements of community well-being and concluded that, on average, the communities were benefitting from the project.

To enhance livelihoods in the communities adjacent to park, strengthen their organization and aid in leakage prevention, two sequential programs were initiated with project funds. The Program for the

[87] Calderón Angeleri, Natalia. Livelihood Impact Assessment: NK-CAP, Bolivia, November 2005. Annex 6 of PDD. "Livelihood" comprises the capabilities, assets (including both material and social resources) and activities required for a means of living.
[88] Asquith, N.M., et al. 2002. Can forest protection carbon projects improve rural livelihoods ? Analysis of the Noel Kempff Mercado Climate Action Project, Bolivia. Mitigation and Adaptation Strategies for Global Change 7: 323- 337.

Sustainable Development of Local Communities (Spanish acronym APOCOM) ran from 1997-2001 and improved access to basic services such as health, education, and communication. The Community Development Program (Spanish acronym PRODECOM), undertaken from 2002-2006, emphasized community development by securing land titling, assisting self-organization, and supporting income generating activities such as community forestry and micro enterprise. 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. It is expected that the Government of Bolivia will carry on future community development activities with a portion of the income it receives from marketing its share of verified carbon benefits from the project. Thus far, however, the government has not commercialized its share nor has it designated how much of the proceeds will go back to the communities bordering the park. Project developers and community leaders are working with the Bolivian Government to resolve these issues.

**Organizational Empowerment**

Over the course of NK-CAP's evolution, the importance of deeply involving communities in project design, ensuring adequate sharing of the project benefits, and respecting and bolstering indigenous rights has been clear. Those analyzing the project with a critical eye might cite lack of community involvement at the earliest stages of project development as a weakness in project design.9 In practice, community involvement can be difficult to achieve if there is a lack of community/organizational structure, as was initially the case with the communities surrounding the Noel Kempff Mercado National Park.

As such, part of the project focused on assisting communities in creating an official indigenous organization with legal status. Project developers helped communities to access the correct government officials and prepare paperwork to group themselves into the official Central Indígena Bajo Paraguá (CIBAPA), a registered organization with legal standing representing the indigenous communities around the park. As a group with legal standing, CIBAPA was eligible to file for land tenure with the National Agrarian Reform Institute (Spanish acronym INRA).

As communities became increasingly organized, they were able to take a more and more active role in the project planning. They fully participate in the management committee of the Park, where all operational aspects of the park are discussed.

## LAND TENURE AND COMMUNITY PROPERTY RIGHTS

Prior to project initiation, none of the communities bordering the park had rights to the land on which they had historically resided and which they had traditionally used for hunting, logging, rubber exploitation, etc. Article six of Supreme Decree #24457, which expanded the NKMNP, recognized and guaranteed the subsistence use and exploitation of renewable natural resources within the expansion zone by communities, subject to the park management plan. Yet, the park management plan was somewhat ambiguous as to activities allowed in the park.10 In order to further protect community members' access to timber, plants and animals, FAN facilitated CIBAPA's claim to 360,565 hectares of indigenous territory adjacent to the expansion area in 1998, and this claim was accepted by the INRA (see Figure 11). In June 2006, the official title for the indigenous territory ("TCO") was granted to CIBAPA.

## 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.

**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.

**HEALTH OUTPOST**

Prior to project implementation, operators of the Moira concession provided the community of Florida with the services of a medical doctor for half a day/week, as well as discounts on medicine.9 In order to compensate for the loss of these services, project developers refurbished and expanded a pre-existing health clinic in the community of Florida, which was in very poor condition, 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. Project funds were used to purchase medicine which is administered by community members, and a doctor was hired to live in Piso Firme and make periodic visits to all of the communities.10

**INCOME GENERATION**

At the time NK-CAP was initiated, sustainable logging, extraction of non-timber forest products, ecotourism, and bio-prospecting were all perceived to be promising avenues for alternative income generation for forest-dwelling communities. The project employed all of these efforts to help raise the standard of living of surrounding communities, to varying degrees of success. While a socioeconomic impact assessment concluded that, on average, the communities were benefiting from the project, the community of Florida still maintained a negative financial impact due to loss of jobs from the Moira sawmill.[89]

Figure 14: Park guards for Noel Kempff Mercado National Park in Bolivia. Photo credit: © Hermes Justiniano.

*Figure 14: Park guards for Noel Kempff Mercado National Park in Bolivia. Photo credit: © Hermes Justiniano.*

## Alternative Employment

One of the more significant initial negative impacts of the project on the communities, particularly the

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

community of Florida, was the loss of jobs from closed timber concessions and sawmills. In total, 20 men from Florida lost their jobs in the Moira sawmill.9 Project developers attempted to compensate for these losses by creating opportunities for alternative employment. For example, approximately 80 community members have worked surveying forest resources both inside and outside of the expansion area.9 Of the 26 full-time park guards, 10 are from the local communities. Furthermore, six community members were trained as tourist guides.

### Sustainable Forestry

Project developers supported the establishment of a sustainable community forest concession within the TCO (see Figure 11). Community members have approval by the Superintendant of Forestry to exploit heart of palm on 11,000 ha of the TCO, as well as practice sustainable forestry in 90,000 hectares of 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. Although the sawmill is not currently turning a profit, money generated from these activities are going directly back into the communities, and help to offset employment losses from the Moira concession.

### Ecotourism

A visitor center was constructed with the aim of fostering income generation through tourism activities, which would work in combination with the project endowment to fund post-project 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 apparent that the remote location of NK-CAP would make travel to the site by tourists both difficult and expensive. Thus, the realized benefits via ecotourism have been fewer than originally anticipated.

### Biotrade

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, to be funneled back into project activities and help fund post-project activities. 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. This included the creation of “Canopy Botanicals,” a company whose aim was to develop products, supplied by the communities, in three market sectors: organic foods (coffee beans, cocoa, mushrooms, and Brazil nuts), botanicals (medicinal plants) and ornamentals (orchids). The company promoted sustainable development as well as the equitable distribution of economic benefits to supplier communities. Unfortunately, the venture ultimately failed due to low returns on its investments, and the investors incurred costs to dissolve the company. The NK-CAP experience underscores the need for robust advance business planning to determine the viability of economic development strategies and avoid losses on investments.

## BIODIVERSITY BENEFITS

Beyond climate mitigation, forest carbon projects have the potential to conserve important biodiversity, 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 use of standards, such as the Climate Community and Biodiversity (CCB) standard, which support biodiversity conservation in the design of climate change mitigation projects, can help secure this co-benefit.

*Figure 15: Blue and yellow macaw at Noel Kempff Mercado National Park in Bolivia, South America. Photo credit: © Hermes Justiniano.*

The Noel Kempff Mercado National Park is located in one of the 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.[90] 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.[91]

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.[92] 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.13 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. 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.

### 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).

## VALIDATION AND VERIFICATION

To ensure that the benefits claimed by carbon projects are real and objectively measurable, a two-step process exists for independent, third-party review and confirmation of carbon project results. 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

[90] IUCN. 2000. World Heritage Nomination – IUCN Technical Evaluation
Noel Kempff Mercado National Park (Bolivia). See: http://whc.unesco.org/en/list/967.
[91] Killeen, T.J. and T.S. Schulenberg (Editors). 1998. A biological assessment of Parque Nacional Noel Kempff Mercado, Bolivia. RAP Working Papers 10, Conservation International, Washington, D.C.
[92] Halloy, S. 1994 Study to determine the biological value of the area west of the Noel Kempff National Park as a basis for its inclusion in the park. Technical Report.

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.

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 (USIJI). NK-CAP was submitted under the USIJI guidelines and received approval in 1996. After the U.S. failed to ratify the Kyoto Protocol, the USIJI 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, in 2004-2005, NK-CAP underwent an ex-post validation and verification assessment for the voluntary market. The validation and verification processes were executed by Société Générale de Surveillance (SGS), registered as a Designated Operational Entity to the Clean Development Mechanism (CDM).

As no REDD voluntary or compliance standard existed, against which the project could be assessed, the project developed its own methodology, based upon the relevant CDM guidelines for afforestation/reforestation projects (as defined October 2005), adapting them for REDD as necessary. SGS used this methodology, as detailed in the Project Design Document ("PDD")[93] as the basis for its validation and verification processes.

In particular, SGS assessed the project's additionality, baseline, potential leakage, monitoring plan, environmental and social impacts 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.

SGS's first validation and verification review resulted in several Corrective Action Requests (CARs), 2 major and 8 minor. These included requests to improve the PDD and to develop an action program to address the needs of the communities adjacent to the park. The requested corrections were made to the PDD, a socioeconomic impact assessment was conducted by FAN to determine the needs of the communities, and a community development action program was developed, which requires the "establishment of a conditioned benefit sharing mechanism based on a participative approach" that would help to "to raise the standard of living as a minimum up to the level that the communities experienced before the commencement of the project."[94] These CARs were subsequently closed out and the project received validation and verification from SGS in 2005 with a total of 1,034,107 metric tons of CO2 verified by SGS for the period of 1997- 2005 (see "Carbon Benefits" section for details).

It is important to note that although all CARs associated with the first validation and verification review were closed out to SGS's satisfaction, future verifications may be in jeopardy. As of this writing, key milestones in the community development action program have not been reached. The program called for the GOB to establish the necessary legal instruments to commercialize the GOB's share of the carbon credits, to commercialize the carbon credits, and to assign carbon credit revenue according to the earmarks set out in the NK-CAP Comprehensive Agreement (which include community development – see Figure 5). Given turn over of government officials and other obstacles, the GOB has yet to complete

[93] The PDD is available at:
http://conserveonline.org/workspaces/climate.change/ClimateActionProjects/NoelKempff/NKPDD/PDDZip/view.html
[94] SGS UK Ltd. Validation and Verification Report Noel Kempff Climate Action Project. Summary Only. PROJECT NO. VOL 0001 DATE: 27 NOVEMBER 2005.

these milestones. The NK-CAP experience brings to light the need for strong local government capacity to establish the necessary legal, financial, and institutional means to manage carbon revenue and benefit sharing.15

**Validation Findings**

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

*SGS validation statement, Executive Summary, November 2005*

**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*

## CONCLUSION

The Noel Kempff Mercado Climate Action Project (NK-CAP) is one of the world's most ambitious endeavors to protect tropical forest, fight climate change by lowering carbon emissions, and contribute to the sustainable livelihoods of local people. The project was brought about through the forward-looking partnership of The Nature Conservancy, the Bolivian government, local conservationists, and three U.S. energy companies, who bought out logging concessions to expand Noel Kempff National Park and worked with local communities to design economic development activities for the benefit of both people and forest health.

Initiated in 1996, in the earliest days of the global movement to recognize the power of tropical forests to fight climate change, the Noel Kempff project pioneered many of the approaches and methodologies that underpin today's most rigorous forest carbon projects. In doing so, it became the world's first large-scale Reducing Emissions from Deforestation and Degradation (REDD) project to scientifically prove that carbon benefits could be achieved by protecting standing forest. In 2005, NK-CAP became the first REDD project to be verified by a third party using rigorous standards based largely on those developed for afforestation/reforestation projects under the Kyoto Protocol's Clean Development Mechanism. This verification underscores the fact that well-designed REDD projects like NK-CAP can produce real, measurable emissions reductions as well as important benefits for biodiversity and local communities. In fact, since its inception, NK-CAP has:

- Avoided over 1 million tons of CO2e from being emitted into the atmosphere;
- Helped local communities achieve legal recognition and title over their traditional lands;
- Doubled critical habitat for threatened species such as the Brazilian tapir and jaguar;
- Provided funding for education and healthcare services in the region;
- Created an endowment to support Noel Kempff Mercado National Park for future generations.

Despite its success on many fronts, NK-CAP is not without opportunities for improvement. In the years since NK-CAP was initiated, carbon markets, forest carbon science, and conservation approaches have all evolved in important ways. As with any early-stage project, NK-CAP broke important ground in these fields, but also holds lessons for other project developers and policy-makers to be able to improve upon the NK-CAP experience.

Notably, the methods for predicting future deforestation and calculating carbon benefits are more sophisticated than they were in the late 1990s. As is evident from the refinements made to the estimated lifetime carbon benefits from NK-CAP, newer, advanced approaches that blend remote sensing data and statistical modeling with time-tested field measurement techniques are able to produce more reliable calculations than were possible at the start of the project.

In addition to the technical advances that have come about since NK-CAP began, new thinking has emerged on the design of forest carbon projects. Innovative legal instruments (e.g., conservation easements) and credit buffers – which were only employed to guard against fire risks in the case of NK-CAP – are now seen as additional ways to address the risk of impermanence in carbon projects. The application of a nation-wide timber model to estimate leakage from cancelled timber concessions in NK-CAP helped underscore the importance of moving to national-scale carbon accounting, which many now see as a critical step to addressing leakage and achieving emissions reductions at the scale needed to avert the worst impacts of climate change.

There have also been new developments in community-based conservation and governance approaches. The use of mechanisms for involving local people, such as participatory planning processes, and benefit-sharing arrangements (e.g., trust funds) has expanded dramatically since NK-CAP was begun, and such approaches are being employed with success around the world to facilitate improved livelihoods and improved environmental outcomes. Awareness of the importance of community participation in every stage of forest carbon project design has reached new heights, although it is clear from the Noel Kempff experience that community organization and capacity are critical pre-conditions for success.

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## 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 CO2 emissions, based on an Annex 1 country's assigned carbon emissions goal under the Kyoto Protocol. AAUs are used to quantify emissions reductions for the purpose of buying and selling credits between Annex 1 countries.

**Baseline 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 (CO2)**: This greenhouse gas is the largest contributor to man-made climate change. Emitted from fossil fuel burning and deforestation

**Carbon Dioxide Equivalent (CO2e)**: 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 CO2e 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 CO2 emissions, generated by a Joint Implementation project and used to quantify emissions reductions for the purpose of buying and selling credits between Annex 1 countries under the Kyoto Protocol.

**Emissions Trading**: A provision of the Kyoto Protocol that allows Annex 1 countries to trade emissions reduction credits in order to comply with their Kyoto-assigned targets. This system allows countries to pay and take credit for emissions reduction projects in developing countries where the cost of these projects may be lower, thus ensuring that overall emissions are lessened in the most cost-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: CO2, CH4, N2O, HFCs, PFCs, and SF6

**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 CO2 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.

**Prompt Delivery**: At contract closure the buyer pays the purchase price for a certain number of offsets which have already been realized and are delivered to the buyer promptly.

**Pro-poor growth**: There are many debates around the exact definition of this term. In broad terms, pro-poor growth can refer to either a relative or absolute concept of poverty reduction. The debate on defining pro-poor growth has very similar characteristics to the debate on how to measure poverty, where relative vs. absolute measures have been debated. The relative concept categorizes growth as pro-poor when it implies that the poor gain more proportionally to the non-poor. However, concentrating on the inequality aspect disregards absolute levels of growth. The absolute definition concentrates on the unqualified level of growth for the poor. Growth is considered pro-poor if the poor population benefits from it in absolute terms, irrespective of how the total gains are distributed within population in question. Both absolute and relative perspectives on pro-poor growth are relevant.

**Renewable Energy Certificates (RECs)**: A Renewable Energy Certificate represents a unit of electricity generated from renewable energy with low net greenhouse gas emissions. One REC represents 1 megawatt-hour.

**Reforestation**: Replanting of forests on lands that have previously contained forest but that have been converted to some other use.

**Regeneration**: The re-establishment of a forest area by natural or artificial means.

**Registration**: The formal acceptance by the CDM Executive Board of a validated project as a CDM project activity.

**Reserve Account**: A percentage of carbon credits withheld from sale as insurance when there is uncertainty and risk involved in project outcomes.

**Retirement**: Retirement is a way of reducing overall emissions by purchasing carbon offsets and retiring them so that they may not be used to offset others' emissions. Retired credits can no longer be traded.

**Secondary Market**: The exchange of emission reductions, offsets, or allowances between buyer and seller where the seller is not the originator of the supply and represents a secondary trade in the particular product.

**Stakeholders**: Stakeholders mean the public, including individuals, groups or communities affected, or likely to be affected, by the proposed project activity or actions leading to the implementation of such an activity.

**Sustainable Forest Management**: Management of forests which incorporates not only economic but also social and environmental goals which helps ensure the long-term sustainability of the forest for future use.

**Temporary certified emission reductions (tCERs)**: A temporary certified emission reduction or tCER is a unit issued pursuant to Article 12 of the Kyoto Protocol for an Afforestation/Reforestation CDM project activity under the CDM, which expires at the end of the commitment period following the one during which it was issued. It is equal to one metric ton of carbon dioxide equivalent.

**United Nations Framework Convention on Climate Change (UNFCCC)**: An international treaty, developed at the 1992 UN Conference on Environment and Development, which aims to combat climate change by reducing global greenhouse gas emissions. The original treaty was considered legally non-binding, but made provisions for future protocols, such as the Kyoto Protocol, to set mandatory emissions limits.

**Validation**: The assessment of a project's Project Design Document, which describes its design, including its baseline and monitoring plan, by an independent third party, before the implementation of the project against the requirements of a specific standard.

**Verification**: Provides an independent third party assessment of the expected or actual emission reductions of a particular abatement project

**Verified or Voluntary Emissions Reductions (VERs)**: Reductions that, unlike CERs, are sold on the voluntary market. VERs are linked neither to the Kyoto Protocol nor to the EU ETS. VERs are sometimes referred to as Voluntary Emissions Reductions.

**Voluntary Market**: The non-regulated market for carbon credits (especially VERs) that operates independently from Kyoto and the EU ETS. Also called the Non-Regulated Market.

**Voluntary Offsetting**: Offsetting purchases made by individuals, businesses, and institutions that are not legally mandated.

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## Section 5: The Project Level Approach

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### 5.3: Project Case Study

- Noel Kempff Mercado Climate Action Project: A case study in reducing emissions from deforestation and degradation. 2009. The Nature Conservancy.

## ANNEX 3: Additional Resources

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:

- The REDD+ Desk: www.theredddesk.org
- 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

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