Chapter 8
LAND USE AND FORESTRY

SYNOPSIS

I. INTRODUCTION

While climate change mitigation has focused largely on reducing emissions of carbon dioxide and other greenhouse gases, our use of land and forests for agriculture, cities, timber production, and other activities also plays a critical role in climate change. Because trees and other plants absorb carbon dioxide, sequester carbon, and release that carbon into the atmosphere when they die, the way we use and manage land greatly affects the climate outcome. Decisions that land managers make all the time — whether to clear land to expand towns and cities, the selection of trees to plant, the length of the harvest rotation, or the use of particular harvest techniques (till versus no-till for agricultural practices or selective logging versus clearcutting in forest management) — will determine whether land use activities help mitigate or exacerbate climate change. If those decisions and practices retain or restore habitat, then land use activities can help mitigate climate change.

At present, land use activities are causing large-scale loss of forests and other habitat

— and massive emissions of carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). From 1970 to 2004, emissions from land-use, land use change, and forestry operations grew 40 percent. By 2004, the IPCC estimated that land use activities, exclusive of agriculture, accounted for 17.4 percent of all greenhouse gas emissions, primarily from deforestation and forest degradation. When agriculture is added, global emissions from land use increased to 31 percent of total greenhouse gas emissions. T. Barker et al., *Technical Summary, in* CLIMATE CHANGE 2007: MITIGATION: CONTRIBUTION OF WORKING GROUP III TO THE FOURTH ASSESSMENT REPORT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE 27, 29 (B. Metz et al. eds., 2007) [hereinafter IPCC WORKING GROUP III, *Technical Summary*]. Later studies indicate that deforestation and forest degradation may contribute less, around 12 percent of total greenhouse gas emissions, but this may reflect increased fossil fuel combustion as much as lower actual rates of deforestation and forest degradation. G. R. van der Werf, et al., *CO_2 Emissions from Forest Loss*, 2 NATURE GEOSCIENCE 737 (2009); *see also* Yude Pan et al., *A Large and Persistent Carbon Sink in the World's Forests*, 333 SCIENCE 988 (Aug. 19, 2011) (finding lower rates of deforestation than used by the IPCC).

Regardless of its precise contribution, deforestation remains the second largest anthropogenic source of carbon dioxide to the atmosphere, after fossil fuel combustion. Deforestation rates have remained high, particularly in developing countries, averaging approximately 13 million hectares per year from 2000 to 2010 (i.e. 130,000 km^2 of forests, or roughly an area the size of England or Arkansas each year). This deforestation is due largely to the conversion of forests to agricultural land, but unsustainable logging practices and the expansion of settlements and infrastructure are also leading causes of deforestation. When afforestation, restoration, and the natural expansion of forests are included in the ledger, net loss of forest is about 5.2 million hectares per year, down from 8.9 million hectares annually in the 1990s. U.N. FOOD & AGRICULTURE ORGANIZATION, GLOBAL FOREST RESOURCES ASSESSMENT 2010 (FAO Forestry Paper 163, 2010). Recent estimates report emissions from deforestation, exclusive of other land use activities, of 4,034 to 4,400 $MtCO_2$ per year from 1990 to 2007, down from the IPCC's 2007 estimate of 5,800 $MtCO_2$ per year. Werf et al., at 737; Pan et al., at 989; G.J. Nabuurs et al., *Forestry, in* CLIMATE CHANGE 2007: MITIGATION. CONTRIBUTION OF WORKING GROUP III TO THE FOURTH ASSESSMENT REPORT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE 544 (2007) [hereinafter IPCC WORKING GROUP III, *Forestry*].

Losses at the country level underscore the significance of deforestation to climate change mitigation. Brazil lost 2.6 million hectares annually from 2000 to 2010 (roughly the size of Vermont or Kuwait), while Indonesia lost about 0.5 million hectares over the same period of time. For Brazil, Indonesia, and some other countries, emissions from deforestation and other land use activities greatly exceed all other sources (*See* Table 8-1). In Indonesia, for example, emissions from land use activities, including deforestation, constitute almost 72 percent of its greenhouse gas emissions, and in Bolivia, land use emissions comprise 69.6 percent. Climate Analysis Indicators Tool (CAIT) Version 9.0 (World Resources Institute, 2012). Indeed, when emissions from land use and forestry are added to industrial emissions, Indonesia's emissions increase by 283 percent, moving it

from the world's twelfth largest emitter to the fifth; Brazil's emissions increase by 281 percent, moving it from the seventh largest emitter to the fourth. *Id.*

Table 8–1 — 2005 Emissions from Land Use and Forestry as Percentage of Total GHG Emissions

Country	Land Use Emissions
Bolivia	69.6%
Brazil	64.4%
Cameroon	65.6%
Dem. Rep. of Congo	65.4%
Indonesia	71.7%
Malaysia	37.7%

Clearly, land use and forestry are important aspects of climate change policy. What is less clear is how the climate change regime should address land use. As you read this chapter, consider the following questions:

- Should the climate change regime provide certified emissions reductions (CERs) for activities that restore or maintain forests? Because forests can be easily cleared by humans or destroyed by natural events, such as disease or hurricanes, any reductions may only be temporary and thus the issuance of the CERs would not necessarily help mitigate climate change.

- To what extent, if at all, should the Parties create incentives for developing countries to reduce deforestation?

- How should the climate change regime's approach to forests reflect other sustainable development goals, such as biodiversity conservation or the rights of forest dwelling communities.

Before exploring these issues, Section II of this chapter summarizes how land use activities affect carbon stocks. Section III explores some special attributes of land use activities that make their incorporation into the climate change regime problematic. It further describes how the Kyoto Protocol addresses land use activities. Lastly, Section IV explores the mechanism being developed in the climate change regime to address deforestation and forest degradation in developing countries.

II. THE ROLE OF LAND USE ACTIVITIES IN CLIMATE CHANGE

The role of carbon and carbon dioxide in land use activities is complex and depends on a number of factors. Critically, carbon sequestration is not simply about forests and forest protection. A large range of land use activities, including agricultural practices, plays an important role in carbon sequestration. In addition, in some habitats far more

carbon is stored in soil than in vegetative matter.

A. Nature's Carbon Warehouse

Photosynthesis and respiration are the starting points for discussing the role of land use activities in climate change, because they are the essential mechanisms by which forests store and release carbon. As plants grow, they absorb carbon dioxide from the air and, through photosynthesis, use solar energy to convert carbon dioxide into carbon, which is stored throughout the plant. Through respiration, plants release some carbon into the atmosphere as carbon dioxide.

Overall, trees and forests are carbon "sinks" — they remove more carbon than they release. In the absence of major disturbances, trees continue to accumulate carbon for 20 to 50 years or more, depending on the species and site conditions. At maturity, about half of the average tree's dry weight is carbon.

> Depending on the stage of stand development, individual stands are either carbon sources or carbon sinks (1 m^3 of wood stores ~ 0.92 tCO_2). For most immature and mature stages of stand development, stands are carbon sinks. At very old ages, ecosystem carbon will either decrease or continue to increase slowly with accumulations mostly in dead organic matter and soil carbon pools. In the years following major disturbances, the losses from decay of residual dead organic matter exceed the carbon uptake by regrowth. While individual stands in a forest may be either sources or sinks, the forest carbon balance is determined by the sum of the net balance of all stands. The theoretical maximum carbon storage (saturation) in a forested landscape is attained when all stands are in old-growth state, but this rarely occurs as natural or human disturbances maintain stands of various ages within the forest.

IPCC WORKING GROUP III, *Forestry*, at 544.

When trees decay and die, plant material is decomposed largely by microorganisms, and the trees become a net source of carbon dioxide emissions as they begin to release more carbon than they absorb. In addition, when forests are harvested, burned, or cleared, or are affected by natural disturbances (e.g., fire or disease), carbon dioxide is released into the atmosphere. Wood that is converted to forest products, such as furniture, lumber, and other products, stores carbon for the life of the product. As we will see in Section III.D.3 of this chapter, the Parties to the Kyoto Protocol have established accounting protocols to address carbon stored in finished products.

Soils also store carbon. When plants decay, they leave behind organic residues, often called humus, which may "persist in soils for hundreds or even thousands of years. At the same time, many factors can slow the decay of organic materials and, as a result, affect a soil's capacity for storing carbon. Inherent factors include climate variables (temperature

and rainfall), clay content and mineralogy." Charles W. Rice, *Storing Carbon in Soil: Why and How?*, 47 GEOTIMES 14–17 (Jan. 2002). Overall, however, soils store far more carbon than either vegetation or the atmosphere: global carbon stocks in soils are estimated to be about 1,100 to 1,600 petagrams (one petagram is one billion metric tons), about twice the carbon in living vegetation (560 petagrams) or in the atmosphere (750 petagrams). *Id.* An IPCC comparison of carbon stocks in various ecosystems is presented in Table 8-2. While these numbers suggest some level of uniformity in the carbon stocks of habitat types, substantial variations exist among similar habitats even within the same region.

Table 8-2: Global Carbon Stocks in Vegetation and Soil Carbon Pools Down to a Depth of 1 Meter

Biome	Area (10^9 ha)	Global Carbon Stocks (Gt C)		
		Vegetation	Soil	Total
Tropical Forests	1.76	212	216	428
Temperate Forests	1.04	59	100	159
Boreal Forests	1.37	88	471	559
Tropical Savannas	2.25	66	264	330
Temperate Grasslands	1.25	9	295	304
Deserts and semideserts	4.55	8	191	199
Tundra	0.95	6	121	127
Wetlands	0.35	15	225	240
Croplands	1.60	3	128	131
Total	15.12	466	2,011	2,477

INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, IPCC SPECIAL REPORT: LAND USE, LAND-USE CHANGE, AND FORESTRY: SUMMARY FOR POLICY MAKERS, 4 (2000).

B. Land Use Factors Affecting Carbon Stocks

How we manage land use activities plays a substantial role in determining whether those activities are a net source of greenhouse gas emissions or a net sink (sequestering more carbon than they emit). Below, the IPCC summarizes the influence of land use activities on sources and sinks of CO_2, CH_4, and N_2O, opportunities to reduce the impact of land use activities on climate change, and uncertainties that challenge our ability to address such activities effectively.

IPCC, IPCC SPECIAL REPORT: LAND USE, LAND-USE CHANGE, AND FORESTRY

(2000)

1.4.1. Land-Use Change

Different factors and mechanisms drive land use and land cover transformation. In many cases, climate, technology, and economics appear to be determinants of land-use change at different spatial and temporal scales. At the same time, land conversion seem[s] to be an adaptive feedback mechanism that farmers use to smooth the impact of climate variability, especially in extremely dry and humid periods. Land-use change is often associated with a change in land cover and an associated change in carbon stocks. For example, … if a forest is cleared, the carbon stocks in aboveground biomass are either removed as products, released by combustion, or decay back to the atmosphere through microbial decomposition. Stocks of carbon in soil will also be affected, although this effect will depend on the subsequent treatment of the land. Following clearing, carbon stocks in aboveground biomass may again increase, depending on the type of land cover associated with the new land use. During the time required for the growth of the new land cover — which can be decades for trees — the aboveground carbon stocks will be smaller than their original value. * * *

When forests are cleared for conversion to agriculture or pasture, a very large proportion of the aboveground biomass may be burned, releasing most of its carbon rapidly into the atmosphere. Some of the wood may be used as wood products; these carbon stocks could thereby be preserved for a longer time. Forest clearing also accelerates the decay of dead wood and litter, as well as below-ground organic carbon. Local climate and soil conditions will determine the rates of decay; in tropical moist regions, most of the remaining biomass decomposes in less than 10 years. Some carbon or charcoal accretes to the soil carbon pool. When wetlands are drained for conversion to agriculture or pasture, soils become exposed to oxygen. Carbon stocks, which are resistant to decay under the anaerobic conditions prevalent in wetland soils, can then be lost by aerobic respiration.

Forest clearing for shifting cultivation releases less carbon than permanent forest clearing because the fallow period allows some forest regrowth. On average, the carbon stocks depend on forest type and the length of fallow, which vary across regions. Some soil organic matter is also oxidized to release carbon during shifting cultivation — but less than during continuous cultivation. Under some conditions, shifting cultivation can increase carbon stocks in forests and soils, from one cut-regrowth cycle to another. Because shifting cultivation usually has lower average agricultural productivity than permanent cultivation, however, more land would be required to provide the same products. In addition, shorter rotation periods deplete soil carbon more rapidly.

Abandonment of cultivated land and pastures may result in recovery of forest at a rate determined by local conditions. Selective logging often releases carbon to the atmosphere through the indirect effect of damaging or destroying up to a third of the original forest biomass, which then decays as litter and waste in the forest (although there are techniques that may reduce these consequences). The harvested wood decays at rates dependent on their end use; for example, fuel wood decays in 1 year, paper in less than a few years, and

construction material in decades. The logged forest may then act as a sink for carbon as it grows at a rate determined by the local soil and climate, and it will gradually compensate for the decay of the waste created during harvest. Clear-cutting of forest can also lead to the release of soil carbon, depending on what happens after harvesting. For example, harvesting followed by cultivation or intensive site preparation for planting trees may result in large decreases in soil carbon — up to 30 to 50 percent in the tropics over a period of up to several decades. Harvesting followed by reforestation, however, in most cases has a limited effect (± 10 percent). This effect is particularly prevalent in the tropics, where recovery to original soil carbon contents after reforestation is quite rapid. There are also some cases in which soil carbon increases significantly, probably because of the additions of slash and its decomposition and incorporation into the mineral soil. [The IPCC also explained that tree plantations exhibit variations in carbon accumulation depending on site conditions, species grown, and pattern of rotational harvests.]

1.4.2. Land-Use Management

Management of forests, croplands, and rangelands affects sources and sinks of CO_2, CH_4, and N_2O. On land managed for forestry, harvesting of crops and timber changes land cover and carbon stocks in the short term while maintaining continued land use. Moreover, most agricultural management practices affect soil condition. A forest that is managed in a wholly sustainable manner will encompass stands, patches, or compartments comprising all stages from regeneration through harvest, including areas disturbed by natural events and management operations. Overall, a forest comprising all stages in the stand life cycle operates as a functional system that removes carbon from the atmosphere, utilizing carbon in the stand cycle and exporting carbon as forest products. Forests of such characteristics, if well managed, assure rural development through working opportunities at the beginning and establishment of forest industries in later stages of the development process. In addition, such forests provide other benefits, such as biodiversity, nature conservation, recreation, and amenities for local communities. For historical and economic reasons, however, many forests today depart from this ideal and are fragmented or have strongly skewed stand age distribution that influences their carbon sequestration capability.

Forest soils present opportunities to conserve or sequester carbon. Several long-term experiments demonstrate that carbon can accrete in the soil at rates of 0.5 to 2.0 t ha^{-1} yr^{-1}. Management practices to maintain, restore, and enlarge forest soil carbon pools include fertilizer use; concentration of agriculture and reduction of slash-and-burn practices; preservation of wetlands, peatlands, and old-growth forest; forestation of degraded and nondegraded sites, marginal agricultural lands, and lands subject to severe erosion; minimization of site disturbance during harvest operations to retain organic matter; retention of forest litter and debris after silvicultural activities; and any practice that reduces soil aeration, heating, and drying.

Cropland soils can lose carbon as a consequence of soil disturbance (e.g., tillage). Tillage increases aeration and soil temperatures, making soil aggregates more susceptible

to breakdown and physically protected organic material more available for decomposition. In addition, erosion can significantly affect soil carbon stocks through the removal or deposition of soil particles and associated organic matter.… Soil carbon content can be protected and even increased through alteration of tillage practices, crop rotations, residue management, reduction of soil erosion, improvement of irrigation and nutrient management, and other changes in forestland and cropland management. * * *

Croplands and pastures are the dominant anthropogenic source of CH_4 and N_2O, although estimates of the CH_4 and N_2O budgets remain uncertain. Rice cultivation and livestock (enteric fermentation) have been estimated to be the two primary sources of CH_4. The primary sources of N_2O are denitrification and nitrification processes in soils. Emissions of N_2O are estimated to have increased significantly as a result of changes in fertilizer use and animal waste. Alteration of rice cultivation practices, livestock feed, and fertilizer use are potential management practices that could reduce CH_4 and N_2O sources. Ecosystem conservation may also influence carbon sinks. Many forests, savannas, and wetlands, if managed as nature reserves or/and recreation areas, can preserve significant stocks of carbon, although these stocks might be affected negatively by climate change. Some wetlands and old-growth forests exhibit particularly high carbon densities; other semi-natural ecosystems (e.g., savannas) may conserve carbon simply because of their large areal extent.

QUESTIONS AND DISCUSSION

1. Given the large variations and uncertainties concerning carbon stocks in different habitats and different regions, are you convinced that land-use activities should be a central feature of the climate change regime? Significant technical and methodological questions exist for measuring changes in carbon stocks. Consider, for example, the difficulties a government will have in assessing emissions from agricultural activities when emissions are dependent on the individual actions of thousands of farmers. How should these considerations shape climate policy?

2. The IPCC outlines the many impacts of land use activities on carbon stocks. It also summarizes some cost-effective strategies for reducing greenhouse gas emissions from land use activities. What are they? What are the principal barriers to implementing these strategies? Consider, for example, that livestock are responsible for 18 to 51 percent of total global greenhouse gas emissions, depending on how much of the commodity chain is accounted for; this is more than the transport sector even at the lower estimate. HENNING STEINFELD ET AL., LIVESTOCK'S LONG SHADOW: ENVIRONMENTAL ISSUES AND OPTIONS (Food and Agriculture Organization, 2006); Robert Goodland & Jeff Anhang, *Livestock and Climate Change*, WORLDWATCH, Nov./Dec. 2009, at 10. In fact, the methane produced by the manure of a single 1,330-pound cow translates into about five tons of CO_2 per year. That is about the same amount generated annually by a typical U.S. car getting 20 miles per gallon and driven 12,000 miles per year. Jeffrey Ball, *Cows, Climate Change and Carbon Credits*, WALL STREET JOURNAL, June 14, 2007, at B1.

What are some of the obstacles to reducing emissions from livestock? Can they be overcome?

3. The IPCC, in its comparison of carbon stocks in soils, concluded that current carbon stocks are "much larger in soils than in vegetation, particularly in non-forested ecosystems in middle and high latitudes." *IPCC Special Report: Land Use, Land-Use Change, and Forestry*, at para. 6. Does this suggest that the international community should shift its focus from reducing deforestation in Brazil's Amazon to ensuring that Canada's tundra is not disturbed?

III. INCORPORATING LAND USE INTO THE CLIMATE REGIME

The importance of reducing deforestation and other habitat loss and increasing reforestation and habitat restoration is unquestioned. Since the negotiations of the United Nations Framework Convention on Climate Change (UNFCCC), governments have contemplated the role of sequestration in the climate change regime. Article 3 of the UNFCCC declares a basic policy to mitigate climate change from "all relevant sources, sinks and reservoirs of greenhouse gases." Article 4 calls on all Parties to develop national inventories of anthropogenic emissions by sources and removals by sinks of all greenhouse gases. It also calls on Parties to formulate and implement national programs containing measures to mitigate climate change by addressing anthropogenic emissions by sources and removals by sinks of all greenhouse gases. The Berlin Mandate, which laid the groundwork for the Kyoto Protocol, called for "coverage of all greenhouse gases, their emissions by sources and removals by sinks."

The question then was not whether the climate change regime would account for land use activities, but how it would incorporate them into the regime. Section A introduces the accounting challenges created by land use activities. Section B describes how these challenges influenced the negotiations of the Kyoto Protocol. Sections C and D then explore the Kyoto Protocol's accounting methodologies concerning land use activities in the first and second commitment periods, respectively. Section E addresses the specific issues raised by the Clean Development Mechanism (CDM).

A. Accounting Challenges of Land Use Activities

Land use activities pose special accounting and other challenges that do not necessarily apply to emissions from industrial sources. For example, unlike industrial sources, land use activities are subject to natural events and disturbances, such as hurricanes and diseases, as well as human activities that call into question whether any reductions in emissions from land use activities will survive the next year or the next decade. When considering how the climate change regime can accommodate land use activities, three fundamental issues must be addressed:

- *Permanence:* Can we guarantee that trees planted to offset carbon dioxide

emissions will not be destroyed in a natural disaster or cut down for firewood?

- *Saturation:* Are there limits to the carbon benefits that can be achieved from storing carbon in vegetation and soils?

- *Verifiability:* Can removals of carbon dioxide from land use activities be accurately measured and verified?

The following excerpt takes a closer look at these issues.

BERNHARD SCHLAMADINGER & GREGG MARLAND, LAND USE & GLOBAL CLIMATE CHANGE: FORESTS, LAND MANAGEMENT, AND THE KYOTO PROTOCOL

8–12 (Pew Center on Global Climate Change, June 2000)[*]

Permanence

Emission reductions in the energy sector can be regarded as permanent. For [land use] activities, on the other hand, there is a possibility that any carbon accumulated or protected in the biosphere might be released at a later time.

To suggest that reductions in the energy sector are permanent is not to say that an activity will continue forever or that reductions achieved in one year will be achieved again the following year. It is not to say that the same molecule of carbon that has been kept out of the atmosphere in one year will be kept out of the atmosphere in the next year. However, achieving lower emissions in one year will seldom lead to higher emissions in later years. If less automotive fuel is used in one year, emissions will not increase in the next as a result. The total, cumulative emissions up to any given time will be smaller. This is true so long as the potential supply of fossil fuels is very large and the question is not simply how soon the fuel supply is fully converted to CO_2.…

For [land use] activities, on the other hand, changes in land ownership, public policy, commitment by the landowner, climate, or natural disturbances such as fire or pests could cause accumulated carbon to be released back to the atmosphere. In fact, increased carbon stocks in the biosphere could increase their vulnerability to subsequent release to the atmosphere by, e.g., accumulating combustible material in fire-prone areas. * * *

Saturation

The potential of the terrestrial biosphere to take up additional carbon is limited by the total land area available and by the amount of additional carbon that can be stored by the

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plants and soils per unit area. This means that at some point in time any net removals of carbon will, of necessity, diminish. The point at which this saturation will occur will vary for different places and will depend on the history of land management. It will sometimes be true that places with the greatest loss of forest and soil carbon in the past will have the largest opportunities for uptake of carbon in the future. * * *

Opportunities to reduce emissions in the energy sector will not be limited by saturation effects. Assuming that the resource of carbon-based fuels is not constraining CO_2 emissions, there will be continuous benefits from limiting use of fossil fuels through energy efficiency or the use of renewable energy. An activity that conserves use of fossil fuels this year can do the same next year and in succeeding years. An activity that increases the carbon in the biosphere this year may or may not be able to do so again next year. * * *

Verifiability

If carbon emissions to the atmosphere are to be offset by increasing the amount of carbon in the terrestrial biosphere, is it possible to accurately measure what has been accomplished? Can measurements affirm that one ton of carbon emissions has been offset by one ton of carbon sequestered in the biosphere? Estimating changes in carbon stocks in the biosphere is not as simple and straightforward as estimating carbon emissions from fossil-fuel combustion. One reason for the difference in uncertainty of the estimates is that fossil fuels are a traded commodity whereas, except for timber, most biospheric carbon is not traded in commercial markets. In the case of fossil fuels, there is an economic incentive for accurately measuring energy flows, and hence the related carbon flows. For carbon in the biosphere, however, there are trade-offs among the economic incentive[s] for measuring changes, the cost of measuring changes in carbon stocks, and the uncertainty in the measurement.

The CO_2 discharged from fossil-fuel burning can be estimated with an uncertainty of perhaps +/-10% on a global basis, and the uncertainty is much less for countries or projects with good statistical data on energy consumption. If energy consumption is reduced with more energy-efficient devices or there is a shift toward fuels with less carbon content, it is straightforward to estimate the amount by which CO_2 emissions have been reduced. Brown et al. suggest that similar uncertainty (+/-10%) can be achieved for [land use] activities at the project level. However, many groups believe that accounting for changes in carbon stocks in the biosphere is inherently more difficult than accounting for carbon emitted by burning fossil fuels. Two significant problems are resolution (recognizing small changes in large numbers) and maintaining the infrastructure needed for regular measurement of changes in carbon stocks. Temporal and spatial variability contribute to high variability in estimates of soil carbon at all scales. Uncertainty can be reduced at the cost of more intense sampling and analysis.

For carbon stored in tree stems, it is estimated that changes in carbon stocks over a ten-year interval can be approximated within +/-10% for a specific project. Uncertainty

will usually be larger for the below-ground carbon in roots and soils, although for some projects a precision level of +/-10% has been achieved. Because changes in soil carbon are likely to involve small changes in large numbers, accurate estimates of the change in soil carbon may require longer time intervals (to achieve a more readily distinguishable change) and extensive and/or expensive sampling. Current methods are effective for evaluating changes in soil organic carbon at relatively low precision (20–50% error) and at widely spaced time intervals (minimum three to five years) with levels of effort that are reasonably affordable. If more sampling is required to improve the quality of estimates, the trade-off between the uncertainty and the cost of the estimate is likely to be encountered.

QUESTIONS AND DISCUSSION

1. The issues of permanence and verifiability raised many questions about how to shape the rules relating to land use activities within the Kyoto Protocol. For example, if removals are not permanent, then it may not be feasible to include removals in any kind of emissions trading scheme. If removals cannot be verified, then it may not be appropriate to consider such removals as "additional." On the other hand, given the large emissions from land use activities, the inclusion of land use activities in the climate change regime can provide an incentive to improve land management and decrease emissions. In order to take advantage of the tremendous opportunities for climate change mitigation from land use activities, should the climate regime sacrifice the certainty that removals of carbon are real and permanent for potential improvements in land management? What mechanisms might you propose to ensure permanence and verifiability of removals?

2. The non-permanence and unpredictability of carbon storage from forests and other types of land is highlighted by data on the impacts of storms, fires, and insects on North American forests. For example, in 2005 Hurricane Katrina killed an estimated 320 million trees, creating a major carbon source that totally nullified the carbon sink of all other U.S. forests for that year. The mountain pine beetle epidemic raging through western North America has turned nearly 500,000 square kilometers of forests from a net carbon sink to a net carbon source. Fires are even more influential on carbon balances as they emit tremendous amounts of carbon and change the albedo effect of wide regions.

3. The conservation and restoration of forests produce a large number of non-climate benefits ("co-benefits") for wildlife, clean water, and other ecosystem functions and social services. How should these positive externalities be considered, if at all, in addressing land use activities under the climate regime? Should the climate regime encourage measures that have positive co-benefits, regardless of uncertainties in the magnitude of their climate benefits?

4. ***"Sources," Sinks," and "Reservoirs."*** Article 1 of the UNFCCC defines a "source" as any process, activity, or mechanism that releases a GHG, an aerosol, or a

precursor of a GHG into the atmosphere. A "sink," in contrast is any process, activity, or mechanism that removes a GHG, aerosol, or precursor of a greenhouse gas from the atmosphere. A "reservoir" is a component of the climate system, such as a forest, where greenhouse gases are stored. Despite these definitional distinctions, many authors conflate these terms, referring to "emissions from sinks" and "emissions by sinks." By definition, however, a sink does not emit greenhouse gases. Rather, forest management activities, as an example, will be a source of emissions if they emit more carbon than they remove or they will be a sink if they remove more carbon from the atmosphere than they emit.

B. The Kyoto Protocol Negotiations

Despite the recognition by the UNFCCC Parties that removals by sinks should be included in the climate change regime, concerns over permanence, saturation, and verifiability made it unclear how the regime should address these removals. The Kyoto Protocol negotiations laid bare not only the differences of opinion about how to address land use activities but also the status of forest management and other land use activities around the world. Concern centered around two sets of issues:

- *Accounting.* In calculating whether countries have met their commitments, how should Parties count emissions and removals from land use activities? Should emissions from land use activities be calculated as part of a country's 1990 baseline emission levels and/or its emissions during the 2008–2012 commitment period?

- *Emissions Trading.* To what extent, if at all, should land use projects that sequester carbon generate credits under joint implementation (JI) or the CDM?

Other issues also infused these negotiations. For some, the opportunity to incentivize improved land use and forest management practices with corresponding co-benefits for biodiversity, water quality, and soil quality indicated that the Kyoto Protocol should include land use in the Kyoto regime. Land use activities could also provide a cost-effective means for reducing emissions without technological innovations of any kind. These negotiators argued that the use of these cost-effective options for reducing emissions could lead countries to negotiate deeper cuts for future commitment periods. Others, however, feared that cost-effective options to sequester carbon in forests would reduce incentives to limit emissions from energy use and the combustion of fossil fuels. While the use of land use options might benefit climate in the short term, their use might increase the cost of mitigation in the medium to long term "if sufficient motivation for developing the innovative technologies needed for deeper reductions is not provided early enough." Schlamadinger & Marland, at 15–16.

As negotiators debated these land use issues, it appeared that they would fail to obtain consensus for moving forward on them. In fact, negotiators did not reach consensus on

the inclusion of sinks until the late stages of the Kyoto negotiations, with the final text on land use only emerging in the final version of the Protocol. Schlamadinger & Marland, at 15.

C. The LULUCF Rules of the Kyoto Protocol

1. *Defining Land Use Activities: LULUCF*

The unease that some countries had concerning permanence, saturation, and verifiability are manifest not only in the accounting rules, which are described in the following section, but also in the distinctions the Kyoto Protocol makes among different types of land-use activities. Rather than treat all land-use activities the same, the Parties defined different types of land-use activities (*see* Table 8-3) and then established different methods for accounting emissions and removals from these activities. While the Parties could not agree on definitions at the time of the Kyoto Protocol, they created a series of *sui generis* definitions for land-use activities captured collectively in the term "land use, land-use change, and forestry," or LULUCF. The importance of these definitions is readily apparent: whereas Article 3.3 requires Parties to account for emissions and removals from afforestation, reforestation, and deforestation activities, Article 3.4 grants the Parties discretion to account for other land use activities, such as forest management, cropland and grazing management, and other "land-use change."

Table 8-3: Definitions of Land Use Activities under the Kyoto Protocol, Decision 16/CMP.1, *Land Use, Land-Use Change and Forestry*, para. 1 (2005)

Land Use Activity	Definition
Afforestation	"the direct human-induced conversion of land that has not been forested for a period of at least 50 years to forested land through planting, seeding and/or the human-induced promotion of natural seed sources[.]"
Reforestation	"the direct human-induced conversion of non-forested land to forested land through planting, seeding and/or the human-induced promotion of natural seed sources, on land that was forested but that has been converted to non-forested land. For the first commitment period, reforestation activities will be limited to reforestation occurring on those lands that did not contain forest on 31 December 1989[.]"
Deforestation	"the direct human-induced conversion of forested land to nonforested land[.]"
Forest Management	"a system of practices for stewardship and use of forest land aimed at fulfilling relevant ecological (including biological diversity), economic and social functions of the forest in a sustainable manner."
Cropland Management & Grazing Land Management	These terms are generally defined as systems of practices on land on which agricultural crops are grown or livestock produced.
Revegetation	"a direct human-induced activity to increase carbon stocks on sites through the establishment of vegetation that covers a minimum area of 0.05 hectares and does not meet the definitions of afforestation and reforestation contained here[.]"

To ensure consistency and comparability among Parties, the Parties also created a common definition of the term "forest" based on the UN Food and Agriculture Organization's definition. "Forest" is defined as

> a minimum area of land of 0.05–1.0 hectare with tree crown cover (or equivalent stocking level) of more than 10–30 per cent with trees with the potential to reach a minimum height of 2–5 metres at maturity in situ. A forest may consist either of closed forest formations where trees of various storeys and undergrowth cover a high proportion of the ground or open forest. Young natural stands and all plantations which have yet to reach a crown density of 10–30 per cent or tree height of 2–5 metres are included under forest, as are areas normally forming part of the forest area which are temporarily unstocked as a result of human intervention such as harvesting or natural causes but which are expected to revert to forest

Decision 16/CMP.1, at para. 1(a). While Parties have some flexibility to define "forest" within the ranges included in the definition, once a Party makes its choice, that definition remains fixed. *Id.* at para. 16.

Although these figures may appear arbitrarily chosen, they were not:

> The amount of canopy cover has a strong impact in the context of the Kyoto Protocol. For example, if a high threshold was set (e.g., 70 percent canopy cover) then many areas of sparse forest and woodland could be cleared or planted and the resultant carbon losses or gains would not be accounted in determining forest emissions/sequestration under the Protocol. If a low threshold was set (e.g., 10 percent canopy cover) then dense forest could be heavily degraded and significant amounts of carbon released, without the actions being registered as "deforestation." Similarly, a forest with low canopy cover (15 percent, for example)[] could be considerably enhanced without the actions actually qualifying as "reforestation" or "afforestation."

Alexander Gillespie, *Sinks and the Climate Change Regime: The State of Play*, 13 DUKE ENVTL. L. & POL'Y F. 279, 297 (2003).

QUESTIONS AND DISCUSSION

1. Review the definitions carefully. The distinctions among afforestation, reforestation, deforestation, and forest management can be subtle. First, "afforestation" and "reforestation" differ only by the time since the area was last forested. Second, to meet the definition of afforestation or reforestation, the unit of land must *not* meet the definition of "forest" on December 31, 1989, whereas the land *must* meet the definition of

"forest" to be eligible for forest management. Third, the definitions of afforestation, reforestation, and deforestation require some conversion of land, but *not* as part of regular forestry operations. For example, if a forested area is harvested and the land converted to pasture, a country must report that as "deforestation," not "forest management," even if the trees are milled for timber. This is because the land has been converted to another use. If the same area is deforested and replanted with a plantation forest designed to produce timber over successive generations, this practice constitutes "forest management," not "deforestation."

Decision 16/CMP.1 defines "forest management" as involving a system of stewardship practices to fulfill ecological, economic, and social purposes. A simpler way to describe forest management may be harvest of trees followed by regeneration for subsequent harvest. A complicating feature of the Kyoto Protocol terminology is that the harvest of trees for timber is not disallowed on afforestation and reforestation lands. Under what circumstances may harvesting of trees take place on afforestation and reforestation lands?

2. *"Forest."* The definition of "forest" under Decision 16/CMP.1 has practical effects beyond distinguishing afforestation/reforestation lands from forest management lands. For example, it precludes road side tree plantings and other "minor" tree planting efforts from qualifying as afforestation and reforestation lands. These may, however, qualify as revegetation lands. In addition, the conversion of natural forests to plantations is not classed as "deforestation." Why?

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2. *Accounting for LULUCF Activities*

Recall that Parties under the Kyoto Protocol must establish baseline emissions levels, generally based on emissions in 1990, and that they must reduce their emissions during the commitment period by some percentage of these baseline emissions. As a consequence, negotiators needed to answer two questions with respect to accounting of land use activities:

- First, when establishing baseline emissions, would Parties be required to account for emissions from industrial sources only or would they also need to account for emissions and removals from land use activities?

- Second, would Parties be allowed to use removals from land use activities to achieve their commitments?

As an initial matter (and somewhat counter-intuitively), the term "gross" emissions of greenhouse gases under the climate change regime refers to total emissions from all industrial sources; it does not include emissions or removals from land use activities, deforestation, and reforestation. "Net" emissions include emissions and removals from both industrial sources and land use activities. Consider the difference between "gross"

emissions and "net" emissions. Assume Country Z has emissions of 100 $MtCO_2eq$ from industrial sources in 1990. These are its "gross" emissions. If Country Z also has 20 $MtCO_2eq$ emissions from land use activities in 1990, its net emissions would be 120 $MtCO_2eq$.

Given the disparities in emissions and removals by land use activities in countries around the world, it is not surprising that Parties came to the Kyoto Protocol negotiations with distinctly different proposals for treating land use. The European Union simply wished to defer inclusion of land use and forestry until better accounting rules could be developed. The United States, seeking to take advantage of its net removals from forests and anticipated increases in removals by sinks, particularly from forestry activities, proposed that all sinks, including forests not under forest management, should be used to calculate baseline emissions and whether a country's commitments had been met; because of large standing forests and roughly 1.6 billion trees planted in 1995, the United States had calculated that its sinks could contribute more than half of its annual reduction obligations by 2010 — 312 million out of 600 million tonnes. *Disappointment at Meagre Progress*, 30 ENVTL. POL'Y & L. 217, 218 (2000).

Other proposals also emerged, including *net-net accounting* and *gross-net accounting*. Using *net-net accounting*, emissions and removals from land use activities (thus, excluding standing forests as in the U.S. proposal) would be used to establish baseline emissions in 1990 and emissions levels during the 2008–2012 commitment period. This accounting method would aid countries with emissions from land use activities in 1990. For example, if Country Z has 1990 emissions from industrial sources of 80 $MtCO_2eq$ and emissions from land use activities of 20 $MtCO_2eq$, then its baseline emissions would be 100 $MtCO_2eq$. If Country Z had agreed to reduce emissions by eight percent, then it would need to ensure that emissions from sources and removals by sinks were no more than 460 $MtCO_2eq$ for the 5-year commitment period (an average of 92 $MtCO_2eq$ per year). For a country like Country Z with large land use emissions in 1990, net-net accounting makes it easier to meet its commitment, because it increases baseline year emissions.

Under *gross-net accounting*, baseline emissions would be based only on gross emissions (i.e., emissions from industrial sources), but countries would count emissions and removals from land use activities when calculating their emissions levels during the commitment period. Gross-net accounting benefits countries like New Zealand with removals from land use activities in their 1990 baseline year. If they were required to account for net emissions in 1990, they would show smaller overall emissions in 1990 and they might have greater difficulty reaching their commitments, particularly if they are unable to maintain removals from land use activities throughout the commitment period.

Consider the situation of Country X using a gross-net approach. Country X has 1990 baseline emissions of 120 $MtCO_2eq$ (120 $MtCO_2eq$ from industrial sources, which would go into the baseline, and removals from land use activities of 20 $MtCO_2eq$, which would

not) and has agreed to reduce its emissions by eight percent to 552 $MtCO_2eq$ during the five-year commitment period, or 110.4 $MtCO_2eq$ per year on average. If it can maintain its current industrial emissions at 120 $MtCO_2eq$ and removals from land use activities at 20 $MtCO_2eq$, its annual emissions in the commitment period will be 100 $MtCO_2eq$ — 10.4 $MtCO_2eq$ below its target. Country X has met its target without reducing its emissions at all. In fact, it may grow its emissions by 10.4 $MtCO_2eq$.

If, however, Country X uses net-net accounting, then its 1990 baseline is 100 $MtCO_2eq$ (120 $MtCO_2eq$ emitted minus 20 $MtCO_2eq$ removed) and it must reduce its average emissions during the commitment period to 92 $MtCO_2eq$ per year. Now it must maintain its removals by sinks at 20 $MtCO_2eq$ and still reduce its industrial emissions by 8 $MtCO_2eq$, a much more challenging endeavor.

For countries with significant deforestation and thus net emissions from land use activities in 1990, gross-net accounting has disadvantages. If Country W has gross emissions in 1990 of 100 $MtCO_2eq$ and land use emissions of 50 $MtCO_2eq$, its baseline emissions would be 100 $MtCO_2eq$. Because emissions from land use will be accounted for in the commitment period, Country W must reverse its land use emissions or find significant reductions from industrial sources.

Negotiators discussed variations on these approaches. For example, both accounting approaches could be limited to certain types of land use activities or to specific time periods. In the jargon of the Parties, an accounting approach that was restricted in some way would be "limited," for example, "limited gross-net" accounting. If no such restrictions were imposed, then the approach would be considered "full," as in "full net-net" accounting.

The Kyoto Protocol's accounting rules for LULUCF ultimately reflect a series of compromises. Article 3 of the Kyoto Protocol adopts neither "full gross-net" nor "full net-net" accounting but rather includes two "limited" approaches that appear to provide accounting benefits for both deforesting and reforesting countries. For most countries, Article 3 adopts a "limited gross-net" approach, but also includes the possibility of "limited net-net" accounting. These approaches are "limited" because only a limited number of land use activities are covered. The Kyoto Protocol also limits its accounting to emissions "since 1990."

KYOTO PROTOCOL, ARTICLE 3

3. The net changes in greenhouse gas emissions from sources and removals by sinks resulting from direct human-induced land-use change and forestry activities, limited to afforestation, reforestation, and deforestation since 1990, measured as verifiable changes in stocks in each commitment period shall be used to meet the commitments in this Article of each Party included in Annex I. The greenhouse gas emissions from sources and removals by sinks associated with those activities shall be reported in a transparent and verifiable manner and reviewed in accordance with Articles 7 and 8.

4. … The Conference of the Parties serving as the meeting of the Parties to this Protocol shall, at its first session or as soon as practicable thereafter, decide upon modalities, rules and guidelines as to how, and which, additional human-induced activities related to changes in greenhouse gas emissions by sources and removals by sinks in the agricultural soil and land-use change and forestry categories, shall be added to, or subtracted from, the assigned amount for Parties included in Annex I, taking into account uncertainties, transparency in reporting, verifiability, the methodological work of the Intergovernmental Panel on Climate Change, the advice provided by the Subsidiary Body for Scientific and Technological Advice in accordance with Article 5 and the decisions of the Conference of the Parties. Such a decision shall apply in the second and subsequent commitment periods. A Party may choose to apply such a decision on these additional human-induced activities for its first commitment period, provided that these activities have taken place since 1990. * * *

7. … Those Parties included in Annex I for whom land-use change and forestry constituted a net source of greenhouse gas emissions in 1990 shall include in their 1990 emissions base year or period the aggregate anthropogenic carbon dioxide equivalent emissions minus removals in 1990 from land-use change for the purposes of calculating their assigned amount.

From a legal perspective, the number of issues that the Kyoto Protocol left unresolved is remarkable, but certainly a reflection of the contentious debate and last minute consensus. In addition to leaving key land-use activities undefined, the Kyoto Protocol left the following issues needing resolution before a country could begin accounting for its LULUCF emissions:

- What constitutes a forest?
- How should possible non-permanence and leakage be calculated, if at all?
- What counts as a "verifiable change[] in stocks"?
- What are "direct human-induced … activities"?
- Are there any limits on how much credit from LULUCF activities a Party may use to meet its commitments?

Because of the large number of critical issues left unanswered, the Parties developed a complex set of rules to implement the LULUCF provisions of Article 3 at the seventh meeting of the Conference of the Parties (CoP7) in Marrakesh in 2001. Decision 11/CP.7 (2001); Decision 16/CMP.1 (2005). These rules 1) define key LULUCF activities, 2) establish a multi-tiered capping system that limits the use of LULUCF activities to meet emission targets, and 3) limit the development of LULUCF activities in the Clean

Development Mechanism. Some of the more important aspects of this decision are summarized below, with Table 8-4 outlining the applicable accounting rules.

Table 8–4: Summary of LULUCF Accounting Rules for the First Commitment Period

<table>
<tr><th>Activity</th><th>Kyoto Protocol Article</th><th>Start Date of Activity</th><th>Accounting</th><th>Accounting Method</th><th>Cap</th></tr>
<tr><td>Afforestation</td><td rowspan="3">3.3</td><td rowspan="3">“started on or after 1 January 1990”</td><td rowspan="3">Mandatory</td><td rowspan="3">Limited Gross-Net</td><td rowspan="3">No cap</td></tr>
<tr><td>Reforestation</td></tr>
<tr><td>Deforestation</td></tr>
<tr><td>Forest Management</td><td rowspan="5">3.4</td><td rowspan="5">“to have occurred since 1 January 1990”</td><td rowspan="5">Voluntary</td><td>Cap Per Country</td></tr>
<tr><td>Revegetation</td><td rowspan="4">Limited Net-Net</td><td rowspan="4">No cap</td></tr>
<tr><td>Cropland Management</td></tr>
<tr><td>Grazing-Land Management</td></tr>
</table>

a. *Afforestation, Reforestation, and Deforestation*

Recall that afforestation, reforestation, and deforestation require some conversion of land to another use and are distinguished from forest management. Also afforestation and reforestation occurs on lands not meeting the definition of “forest” whereas deforestation and forest management doe s occur on lands defined as ‘forest.”

As noted above, Article 3.3 applies mandatory limited gross-net accounting to afforestation, reforestation, and deforestation activities. First, the Parties limited accounting to afforestation (A), reforestation (R), and deforestation (D) projects *initiated since 1990*. However, 1990 is not a baseline for measuring whether a Party’s ARD activities have resulted in net emissions or removals; it is the date by which the Parties determine whether ARD projects are subject to accounting. That is, a Party must account for those projects started on or after January 1, 1990. Second, Parties limited the emissions and removals that could be accounted to “net changes … measured as verifiable changes in carbon stocks in each commitment period.” Thus, if a Party has removals of 100 $MtCO_2eq$ in 2008 and 175 $MtCO_2eq$ in 2012, then it would report net removals of 75 $MtCO_2eq$ for the commitment period.

The “limited” aspects of the Article 3.3 accounting rules reflect the negotiators’ desire to avoid creating windfall removals or unwarranted emissions from ARD activities. *See* Gillespie, *Sinks and the Climate Change Regime*, at 290–91. Consider Country A, which deforested its land before 1990 but then began a massive reforesting

effort from 1990 to 2000. The rapid growth of all these young trees would give Country A windfall removals if it was allowed to account for all removals from 1990 to 2012 without accounting for any emissions from the deforestation before 1990. It is for this reason that the Parties limited accounting on ARD lands to net changes in carbon stocks between 2008 and 2012.

Similarly, if Country B began reforesting land prior to 1990, but then converted this land by removing the trees before 2008, the state's emissions would appear to increase. By accounting only the net changes in stocks between 2008 and 2012, Country B is protected from accounting for unwarranted emissions.

The Parties also adopted a separate rule to avoid penalizing Parties that began converting forests to other uses during the first commitment period. In these circumstances, the Parties agreed that emissions from harvesting following afforestation and reforestation that occurred since 1990 could not be greater than the removals earned on that unit of land. Decision 16/CMP.1, at Annex, para. 4. Thus, if emissions are larger than removals from harvesting on a specific unit of land, then a net balance of zero should be recorded.

The Parties developed another set of protocols to ensure consistent reporting of removals and emissions from afforestation, reforestation, and deforestation. First, the Parties must classify particular lands as afforestation or reforestation (A/R) lands or deforestation (D) lands, based on the definitions included in Decision 16/CMP.1. If land meets one of these definitions, a Party must designate it as such unless the Party chooses to report changes in GHG emissions and removals on that land as an elected activity under Article 3.4. In other words, land use activities on lands meeting A/R or D classification *must* be factored into a Party's emissions calculations one way or the other. Once a Party classifies land as A/R or D, it must account for all net changes in GHG emissions or removals, including changes resulting from natural regeneration and natural disasters, between 2008 and 2012. Since the reporting obligations of Article 3.3 are mandatory, a Party may not reclassify A/R or D as Article 3.4 lands, which are subject to voluntary reporting. Thus, even if land designated as A/R later comes under forest management, it must remain classified as A/R land under Article 3.3 for the entire commitment period. This requirement is intended to prevent Parties from shifting lands to forest management in order to avoid accounting for emissions on those lands. The classification of deforested land is permanent for the commitment period.

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b. *Revegetation and Cropland and Grazing Land Management*

In contrast to mandatory reporting of Article 3.3 emissions and removals, accounting for other LULUCF activities — revegetation, cropland management, grazing land management activities, and forest management — is voluntary under Article 3.4 in the first commitment period. Parties were able to choose, by 2007, which Article 3.4 LULUCF activities they would count.

Rather than use the limited gross-net accounting method that applies to activities under Article 3.3, accounting for revegetation and cropland and grazing land management activities (but not forest management) is on a limited net-net basis. *See* Decision 16/CMP.1, para. 9. For eligible activities — activities that have occurred since 1990 and are human-induced — a Party must subtract net GHG emissions or removals for the chosen activities during the commitment period from net emissions or removals in 1990 (multiplied by five to account for the five-year commitment period).

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c. ***Forest Management***

As with other Article 3.4 LULUCF activities, Parties have discretion to account for forest management activities. If they choose to account for forest management activities, then they must follow a third accounting approach developed specifically for forest management activities in the first commitment period. *See* Decision 16/CMP.1, Annex, paras. 10–12.

Under this accounting approach, two significant conditions apply. First, a Party's afforestation, reforestation, and deforestation activities on lands designated as A/R or D lands must result in net emissions. If that condition is met, then the Party may offset these emissions through activities on land designated as forest management land, but only up to 9 megatons of carbon (MtC) per year for the five-year commitment period. Second, a Party may include forest management activities to help meet its emission targets beyond 9 MtC per year, but only up to the individual cap specified for each Annex B Party in the Appendix to Decision 16/CMP.1. These caps vary substantially. Twenty-five countries have a limit of 0.50 MtC per year or less, but Japan, Canada, and Russia have much larger caps of 13 MtC per year, 22 MtC per year, and 33 MtC per year, respectively. *Id.* at Appendix; Decision 12/CP.7 (2001).

Where did these limits come from? Prior to walking out of the negotiations at the sixth meeting of the Conference of the Parties, the United States had estimated that removals from sinks could provide as much as half of its annual reduction commitment by 2010, and it wanted to claim all of these removals in its accounting. The EU, pointing to the scientific uncertainty in calculating removals from sinks, insisted on limits. At one point, the United States reduced its claim from sinks from 312 to 20 million tons, but the talks collapsed nonetheless. With the United States no longer participating in the negotiations, entry into force of the Kyoto Protocol hinged on Canada, Japan, and Russia ratifying the Protocol. With the potential collapse of the Protocol looming, the Parties granted these three countries disproportionate forest management allowances. *See* Gillespie, *Sinks and the Climate Change Regime*, at 289–90 (providing a history of the forest management negotiations).

The actual limits were derived based on an 85 percent discount factor (i.e., a value representing 15 percent of actual carbon sequestration) and a cap of 3 percent of a Party's

base year emissions for forest management removals. The Parties discounted 85 percent of forest management removals to avoid crediting removals resulting from elevated CO_2 concentrations above their pre-industrial level (many plants photosynthesize faster and thus sequester carbon more rapidly when CO_2 concentrations are higher). In addition, because most Annex I countries primarily had rapidly growing young forests in 1990, management *since* 1990 would not produce "the majority of carbon sequestration occurring during the commitment period in these forests, but simply business-as-usual management and the existing age structure. By restricting the amount of credits that most Annex I countries may earn for 'forest management' in forests that existed before 1990 to roughly 15 percent of actual national forest carbon increment, Parties found a practical solution to this vexing problem." Kenneth L. Rosenbaum et al., *Climate Change and the Forest Sector: Possible National and Subnational Legislation* 10 (FAO, 2004).

QUESTIONS AND DISCUSSION

1. Article 3.3 establishes the basic rule for accounting for afforestation, reforestation, and deforestation activities. Yet, Australia successfully argued for the inclusion of an alternate accounting rule for these activities, which is included in Article 3.7. How do these accounting rules differ? Australia reported LULUCF emissions in 1990 that were 14 percent of its total greenhouse gas emissions. Why would Australia benefit from the accounting rule in Article 3.7?

2. Commentators have argued that "[t]his new accounting system will reward countries that are increasing their forestry sinks, and penalize those whose sinks are decreasing." Clare Breidenich et al., "*The Kyoto Protocol to the United Nations Framework Convention on Climate Change*," 92 A.J.I.L. 315, 322–323 (1998). Do you agree?

3. *Removal Units.* To distinguish removals from land use activities from other types of emissions reductions, the Parties created a new unit — removal units (RMUs). RMUs are generated from removals of greenhouse gases from eligible LULUCF activities under Articles 3.3 and 3.4. Annex I Parties may use RMUs to help meet their emissions targets. RMUs, as with certified emissions reductions from CDM projects and emission reduction units from JI projects, must be verified by expert review teams under the Kyoto Protocol's reporting and review procedures. In addition, they may not be banked. Where a Party's LULUCF activities result in a net source of greenhouse gas emissions, they count against the country's assigned amount. Decision 13/CMP.1, *Modalities for the Accounting of Assigned Amounts under Article 7, Paragraph 4, of the Kyoto Protocol*, Annex (2001).

D. LULUCF Rules in the Second Commitment Period

Since early in the negotiations for establishing a second commitment period, it became clear that many Parties were unhappy with the accounting rules for LULUCF. Some countries, like Canada, had forests change from net sinks to net sources of emissions as insects decimated vast tracks of forestlands. Other countries were set to harvest plantations and forecasted massive emissions under the current rules. As a result, the Kyoto Protocol Parties set out to accommodate these ecological situations and governmental interests.

They began be reaffirming the definitions of afforestation, reforestation, forest management and other land use activities included in Decision 16/CMP.1. *See* Table 8–3. As a consequence, what constitutes AR and D lands remains the same in the second commitment period as in the first, except that the AR and D activities may now commence through the end of the first commitment period. The limited gross-net accounting rules also remain the same for AR and D lands. Similarly, Parties must continue to distinguish between AR lands and forest management lands based on the definition of "forest" and the definitions included in Decision 16/CMP.1. *See* Section III.C, above. From this point of symmetry between the first and second commitments periods, the Parties adopted very different accounting rules for forest management and new accounting rules for natural disturbances and harvested wood products, which they adopted in December 2011 as part of the Durban Package. Decision 2/CMP.7, *Land Use, Land-use Change and Forestry* (2011).

1. *Forest Management*

Among the changes made to LULUCF accounting rules, perhaps most significantly, Decision 2/CMP.7 replaces the accounting rules for forest management included in Decision 16/CMP.1. First, Decision 2/CMP.7 requires developed country Kyoto Protocol Parties to account for emissions and removals on lands designated as forest management lands even though such accounting is voluntary under Article 3.4 of the Kyoto Protocol. Because a number of Annex I Parties were not accounting for forest management, this change potentially makes accounting of emissions more complete and thus more accurate.

Second, the Parties adopted completely new rules for accounting emissions and removals on forest management lands, rules that Tuvalu and others have dubbed the "logging loophole." Under the new rules, emissions and removals for forest management are equal to emissions and removals during the second commitment period minus a reference number multiplied by the number of years in the commitment period (five or eight, depending on a final decision to be made). Removals for all Parties will be capped at 3.5 percent of a Party's baseline emissions, excluding LULUCF emissions. Decision 2/CMP.7, Annex, paras. 11–12.

It is the reference number that has become so controversial. Individual Parties were allowed to calculate their own reference numbers based on projections of their anticipated emissions and removals. In many cases, Parties forecast emissions that greatly exceed

historical emissions levels from forest management. *See* Figure 8–1. If their actual emissions are below this figure, then the Party will have net removals. Only if emissions exceed this reference level will a Party incur emissions. Based on this methodology, a Party could have substantial actual emissions from forest management — that is, the Party has cut more forest than it replanted — but because this was factored into the reference level the Party will show no emissions or even net removals. In fact, most Annex I Parties estimate that they will have zero net emissions from forest management during the second commitment period.

Figure 8–4 [insert charts showing historic emissions v. reference level emissions]

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2. *Other Article 3.4 Activities*

The rules for voluntary accounting for other Article 3.4 activities, such as revegetation and cropland and grazing land management, remain largely the same as in the first commitment period. *See* Section III.C.b. In other words, emissions or removals will be equal to total emissions and removals during the second commitment period less emissions and removals during the baseline year multiplied by the number of years in the commitment period. Decision 2/CMP.7, Annex, para. 10. The only difference is that the Parties may have some choice in choosing their baseline year whereas in the first commitment period the baseline year was set at 1990.

The Durban Package did add one additional Article 3.4 activity: "Wetland drainage and rewetting." This activity is meant to capture the impact on emissions of draining and restoring (re-wetting) peatlands. Accounting for these activities will also be net-net.

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3. *Harvested Wood Products*

The challenges of accounting for greenhouse gas emissions are underscored by the question of how to account for harvested wood products. Not only is CO_2 released during harvesting, it is also released during the manufacture of wood products and by the use and disposal of wood. On the other hand, carbon is stored for years, even centuries, in tables, chairs, and many other finished wood products. Should Parties report emissions from those products as if all emissions occur at the time the wood is harvested to produce those products? This is known as "instantaneous oxidation" in Kyoto Protocol jargon. In the alternative, should emissions be discounted over time based on a "decay rate" to reflect that the wood is stored in these products for long periods of time?

Prior to the meeting of the Kyoto Protocol Parties in Durban in 2011, the reporting on harvested wood products was optional. The Subsidiary Body on Scientific and Technological Assessment had invited Parties to report voluntarily on harvested wood products in their national inventories, but only four Parties did so: Australia, Canada, the United Kingdom, and the United States.

In Durban, however, the Parties mandated that Parties account for their emissions from harvested wood products removed from forests that a Party accounts for under Articles 3.3 and 3.4. Decision 2/CMP.7, Annex, para. 16. The Decision establishes instantaneous oxidation as default accounting rule. With the exception of harvested wood products resulting from deforestation which shall always be based on instantaneous oxidation, the Parties have two alternative methods for accounting emissions from harvested wood products, provided that verifiable and transparent activity data are available. First, a Party may use estimates for changes in carbon pools of harvested wood products based on decay rates and half-lives for various wood products, such as paper (two years) and sawn wood (35 years). Second, a Party may use country-specific data to replace the default half-lives or use methodologies provided by the IPCC. In addition, imported harvested wood products are excluded from this accounting. *Id.* at Annex I, paras. 14, 16, 26–32.

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4. *Natural Disturbances*

A range of concerns, many climate induced, have caused the Parties to reconsider how to address emissions from natural disturbances. Canada has been one of the leading advocates for omitting emissions from natural disturbances, such as wildfires and insect infestations, largely due to the devastating impacts of a massive mountain pine beetle (*Dendroctonus ponderosae*) outbreak. The mountain pine beetle lays its eggs under the bark of mature lodgepole pine and jack pine trees, a practice that ultimately kills the trees. By the end of 2006, the mountain pine beetle had killed 130,000 square kilometers of forest in western Canada. W.A. Kurz et al., *Mountain Pine Beetle and Forest Carbon Feedback to Climate Change*, 452 NATURE 987 (2008).

The effect on Canada's CO_2 emissions has turned Canada's forests in the affected region from a net sink to a net source of emissions. Scientists estimate the cumulative impact of the mountain pine beetle outbreak during 2000 to 2020 to be 270 MtC on average over 374,000 km^2 of forest. To put this in perspective, the maximum annual beetle impact (20 MtC per year for the scientists' relatively small study area) is nearly equal to direct forest fire emissions of 27 MtC per year for all of Canada from 1959–1999. As another comparison, the net greenhouse gas emissions over 21 years of 990 $MtCO_2eq$ from one insect outbreak is equivalent to about 5 years of emissions of 200 $MtCO_2eq$ from Canada's transportation sector (based on emissions in 2005). *Id*. at 988–89.

Canada and others, quite obviously, do not want to account for these emissions, claiming that they are "acts of God." Environmentalists respond that many of these insect infestations and other natural disturbances are in fact "acts of man," because climate change is a major driver of these disturbances. In the case of the mountain pine beetle, warmer temperatures allow the beetles to survive the winter and establish much larger populations.

The Kyoto Protocol Parties eventually decided that Parties may exclude from accounting those emissions resulting from natural disturbances — activities such as fires, pests, and extreme weather events that are "beyond the control of, and not materially influenced by, a Party." A Party may exclude these emissions provided that they exceed background levels for forest disturbances based on emissions from 1990 to 2009. The Parties may not exclude emissions under this regime if the land is subject to salvage logging or land-use change following the disturbance. Decision 2/CMP.7, Annex, paras. 1(a), 33–36.

QUESTIONS AND DISCUSSION

1. ***Forest management.*** Environmentalists relentlessly ridiculed the proposal that became the new forest management accounting rule as the "logging loophole." They objected that Parties could choose their projected reference level — i.e., their baseline emissions levels — by assuming that emissions will increase, thereby ensuring that no emissions have to be accounted for. The Climate Action Network criticized the rules with the following analogy:

> Imagine this 'rule' being applied to electricity generation. A country could build as many new coal-fired power stations as it liked, and as long as the country first announced that it would do so, they would not have to account for any of the emissions.

Climate Action Network International, *LULUCF for Ministers*, ECO, Nov.–Dec. 2011, at 1 (Dec. 7, 2011). Is the criticism fair? One executive from the forest products industry in New Zealand believes the rules are fair, at least as applied to New Zealand, because they reflect forest management harvest cycles; although New Zealand has been building carbon stocks since 1990, its forests are now ready for harvest and New Zealand should not be punished for its decision to log forests that are ready for harvest. Do you agree?

2. As noted above, Tuvalu led the attack on the LULUCF rules for forest management and submitted an alternative. Tuvalu's proposal would require net-net accounting relative to the first commitment period — i.e., subtract emissions and removals during the second commitment period from the yearly average of emissions and removals from forest management activities during the first commitment period (times the number of years in the new commitment period). FCCC/KP/AWG/2011/CRP.2/Rev.1, 30–31 (Oct. 7, 2011). Environmentalists applauded Tuvalu's proposal as the only "option on the table that has

no loopholes, has environmentally integrity and is consistent with accounting in other sectors." Ecosystems Climate Alliance, *LULUCF: The 'No Loopholes' Environmental Integrity Package for Ministers* (undated), http://www.wetlands.org/LinkClick.aspx?fileticket=K20mAjYVlzw%3d&tabid=56.

3. ***Harvested Wood Products.*** Is it realistic for Parties to report on the amount of carbon stored in wood products, such as paper? Also, do you think that Parties should account for wood products traded internationally? If Germany imports wooden desks from Canada, how should that be reported? Parties do not account for the carbon content of other imported products, including those that might over time degrade and release carbon dioxide or other greenhouse gases. Why should wood products receive different treatment?

4. ***Natural Disturbances.*** Given the large emissions from natural disturbances, it is critical that the Parties find a valid way to account for those emissions or to otherwise take them into account in establishing country-wide emissions goals. At the domestic level, countries must also decide how to mitigate the effects of natural disturbances through adaptation measures. Canada has responded to the mountain pine beetle outbreak by intensifying clear-cut logging of infested stands of trees to slow the spread of the beetle and to quickly send to market any lumber that still holds economic value. That approach could have beneficial economic and climate effects: the sawn wood from these trees not only provides a marketable product but stores carbon in the timber or other finished product. However, some scientists such as David Suzuki believe that "[t]he hyper-pace, scale and intensity of clearcutting threatens to exacerbate greenhouse gas emissions from infested stands." Brian Hoyle, *Plight of the Pines*, 2 NATURE REPORTS CLIMATE CHANGE 52, 53 (MAY 2008). Suzuki also fears that Canada's approach may lead to more destructive outbreaks by creating even-aged stands of lodgepole pine, which the pine beetles preferentially target. *Id.* Is Canada merely making the best of a bad situation? What other options does Canada have, at least until a sufficiently cold winter kills the beetles' larvae or the supply of susceptible trees runs out.

E. LULUCF and the CDM

As with other LULUCF issues, the Parties struggled with concerns over permanence and verifiability to determine whether to make LULUCF projects eligible under the CDM. Other issues were also at play. Because Article 12 of the Kyoto Protocol refers to "emissions" but excludes references to "removals by sinks," it was unclear whether LULUCF projects were permissible under the CDM. In addition, most of the developing countries considered LULUCF projects under the CDM as yet another loophole for developed countries to meet their commitments without decreasing their own domestic emissions. They also worried that because LULUCF projects do not require any technology their inclusion in the CDM would reduce technology transfers to developing countries while still giving developed countries what they want — certified emissions reductions (CERs). From a technical perspective, some cited the lack of permanence of

carbon sequestration from LULUCF activities as a reason to exclude them from the CDM. Others, particularly Brazil, feared an erosion of sovereignty if developed countries and their corporate citizens established long-term interests — CERs — in developing country forests.

LULUCF-CDM advocates, such as the Umbrella Group (a loose coalition of non-EU developed countries that usually includes Australia, Canada, Iceland, Japan, New Zealand, Norway, the Russian Federation, Ukraine, and the United States) and many Latin American countries that would benefit from LULUCF projects, countered that the severity of climate change compelled the use of all abatement strategies. They further argued that because deforestation caused significant carbon dioxide emissions, the CDM should be used to help prevent deforestation. *See* Emily Boyd, et al., *The Politics of Afforestation and Reforestation Activities at COP-9 and SB-20* (Tyndall Briefing Note No. 12, Nov. 2004), *at* http://www.tyndall.ac.uk/sites/default/files/note12.pdf.

Eventually, LULUCF-CDM proponents prevailed, but not before the Parties developed a comprehensive array of Decisions to address the concerns of LULUCF-CDM opponents. First, the Parties sought to reduce uncertainties due to non-permanence and verifiability by limiting LULUCF-CDM activities to afforestation and reforestation. They also limited use of CDM-related afforestation and reforestation (A/R) projects to one percent of an Annex I Party's base year emissions, times five (to account for the five years of the 2008–2012 commitment period). Decision 16/CMP.1, *Land Use, Land-Use Change and Forestry*, Annex, paras. 13–14 (2005). The same rules apply to the second commitment period. Decision 2/CMP.7, *Land Use, Land-Use Change and Forestry*, Annex, paras. 17–19 (2011).

The Parties also addressed non-permanence through an innovative crediting system. The first step in the CDM's temporary crediting system is for the project participants to choose one of two crediting periods. They may choose a non-renewable crediting period of a maximum of 30 years or a 20-year crediting period that may be revised and renewed up to two times for a possible crediting period of 60 years. Decision 5/CMP.1, *Modalities and Procedures for Afforestation and Reforestation Project Activities under the Clean Development Mechanism in the First Commitment Period of the Kyoto Protocol*, para. 23. (2005). These projects enjoy long crediting periods, because A/R activities are unlikely to generate any removals for a number of years, yet they may incur emissions early on as project participants clear land and disturb soil to initiate the project.

Credits from LULUCF CDM projects are temporary: they must be re-verified every five years. If the project has lost carbon or project sponsors have failed to re-verify the carbon stock, temporary CERs must be replaced by other temporary or permanent credits (e.g., AAUs, CERs, EERUs, RMUs). In addition, a Party that wants to use a temporary credit to meet its Kyoto protocol target must replace those temporary credits with other temporary or permanent credits. Decision 5/CMP.1, Annex, paras. 41-44.

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QUESTIONS AND DISCUSSION

1. Although the Parties limited the use of the CDM to A/R in order to limit the risk of non-permanence and concerns regarding monitoring and verification of removals, that choice has put in sharp relief the definitions of "forest," "afforestation," and "reforestation." To begin with, a valid A/R CDM project must take place on land that was non-forested in 1990 or for a period of at least 50 years. In addition, the area must be smaller than the minimum size to qualify as a "forest." As Michael Dutschke writes, these definitions limit the possibility for A/R CDM projects:

> In most cases, the project area is fragmented, because there are single patches still forested or deforested after 1990 that need to be excluded from the activity area. Except for providing an alternative source of timber, there are no benefits from A/R CDM for standing forests, because the eligible areas are far away from the deforestation frontier, while forest management on areas recently deforested or degraded is a non-eligible activity.

MICHAEL DUTSCHKE, FORESTRY, RISK AND CLIMATE POLICY 4 (2010).

2. As of May 2012, 4077 CDM projects have been registered; only 37 are A/R projects (0.78 percent). The World Bank's BioCarbon Fund, which has invested in CDM A/R projects, points to a number of reasons for low participation in A/R projects. One important factor, it claims, is the "replacement rule," which requires tCERs and lCERs to be replaced with another type of credit (e.g., an AAU or permanent CER) in order to use the tCERs and lCERs for meeting emissions targets. As a consequence, the price of tCERs and lCERs depends on future prices for permanent carbon credits, which are difficult to estimate given the uncertainty and volatility of carbon markets. According to the BioCarbon Fund, "[a]s a result of the 'replacement rule,' prices paid by the [BioCarbon Fund] per validated tCO_2e are low, ranging between $4–5 per unit." BIOCARBON FUND, BIOCARBON FUND EXPERIENCE: INSIGHTS FROM AFFORESTATION AND REFORESTATION CLEAN DEVELOPMENT MECHANISM PROJECTS, para. 3.24 (2011). The BioCarbon Fund also notes that demand for forest carbon credits is still very limited, in part because 1) the EU ETS and other domestic emissions trading schemes exclude A/R projects, and 2) most project developers still lack the capacity to apply the rules for greenhouse gas accounting effectively, BIOCARBON FUND EXPERIENCE, at 3. Given this information, what should the Parties do, if anything? Should they eliminate the replacement rule to spur investment in A/R CDM projects or otherwise simplify rules, as they have for small-scale A/R CDM projects (see Chapter 6, Section III.D.1., at note 4)? Should they instead eliminate A/R CDM projects because they are too costly to develop and verify that removals are permanent?

The Parties have acknowledged that other approaches might be necessary to encourage more A/R CDM projects. As such, they have discussed the following possibilities as additional ways to implement A/R CDM projects:

- Responsibility could be assumed on a voluntary basis by the host Party for the cancellation of permanent units in the event of a reversal of greenhouse gas removals by sinks that had occurred through project activities;
- Insurance could be issued for project activities to cover the cancellation of permanent units in the event of a reversal of greenhouse gas removals by sinks that had occurred through these project activities;
- Buffers could be established to ensure that quantities of credits for carbon stored through project activities are reserved for cancellation in the event of a reversal of greenhouse gas removals by sinks that had occurred through these project activities;
- Credit reserves could be established to ensure that quantities of units that are not retired at the end of a commitment period are reserved for cancellation in the event of a reversal of greenhouse gas removals by sinks that had occurred through project activities; and
- Exemptions could be created from modalities and procedures for addressing potential non-permanence in the case of low-risk LULUCF project activities.

FCCC/KP/AWG/2009/INF.2, Annex I, para. 2 (Mar. 12, 2009). Might any of these options spur investment in A/R CDM projects while also ensuring the permanence of removals from such projects?

3. ***Environmental and Socio-Economic Impacts.*** To ensure that afforestation and reforestation CDM projects do not cause adverse environmental and socio-economic impacts, project participants must analyze these impacts. Decision 5/CMP.1, *Modalities and Procedures for Afforestation and Reforestation Project Activities under the Clean Development Mechanism in the First Commitment Period of the Kyoto Protocol*, Annex, para. 12(c). Project participants must assess the impact of the project on biodiversity and natural ecosystems, as well as impacts outside the proposed project boundary. Specific environmental impacts that should be described include impacts on hydrology, soils, risk of fires, pests, and diseases. Decision 5/CMP.1 also provides that they should assess impacts on local communities, indigenous peoples, land tenure, local employment, and food production, among other socio-economic impacts. *Id.*, Appendix B, paras. (j)–(k). If the project participants or the host Party believe that any of the impacts are significant, the project participants must prepare a socio-economic or environmental impact assessment consistent with national regulation of the host country. They must also describe any mitigation measures that will be taken to avoid those impacts. *Id.*, Annex, para. 12(c). When verifying additionality and other aspects of the project, the designated operational entity must determine whether the project participants monitored socio-economic and environmental impacts consistently with their monitoring plan. These provisions, however, are tied to the host country's procedures for impact assessment. What should happen if the host country does not have such procedures or they are inadequate to address the impacts identified in Decision 5/CMP.1?

These rules differ from the requirements for other CDM projects. For example, the

rules for non-A/R small-scale CDM projects do not require an assessment of socio-economic impacts and require an environmental assessment only if the host country requires it. Decision 4/CMP.1, *Guidance Relating to the Clean Development Mechanism*, Annex II, para. 22(c) (2005). For "regular" CDM projects with potential significant impacts, however, project participants must prepare an environmental impact assessment in accordance with the laws of the host country. Decision 3/CMP.1, Annex, para. 37(e). Do you think forest projects generally have greater risks, warranting stronger assessment requirements, than conventional CDM projects?

4. The first LULUCF CDM project, registered in November 2006, involved the replanting of 4,000 hectares of heavily degraded land with pine, oak and other species in southern China. The project planned to sequester about 26,000 $MtCO_2eq$/year, which will be sold via the World Bank's BioCarbon Fund to the governments of Spain and Italy. The project includes two districts and about 5,000 households in 10 communes. Although this land is communally owned, many households have abandoned agriculture and their collective lands lie idle. As a result of the LULUCF CDM project:

> These communes will surrender the title of this land to a local forestry company which, in exchange, will pay for the establishment and management of plantations, and then share with households 60% of the revenue from the sale of forest products and 40% of the revenue from sale of CERs. In addition, the company will employ local labour. About 80% of the land will be managed in this way. The remaining 20% of the land will be planted by independent farmer groups. They have to lease the land from their communes for 50 years, and cover establishment costs, but they will be the sole beneficiaries of income from sale of forest products and CERs [from this land]. Their scheme will be registered by the forest company, which will sell the CERs on their behalf.
>
> Over the 30 year life of the project, total income of $21 million ($4200/household, or $140/hh/year) will be generated, 75% from employment, 15% from forest products and 10% from sale of CER[s], estimated at $3/[metric tons]$CO_2e$. So the annual net benefit from the CDM will be around $14 per household.

Ben Vickers & Catherine Mackenzie, *Forestry in the Clean Development Mechanism: Potential Benefits for the Rural Poor* (undated)

5. ***Additionality.*** With respect to additionality, the Parties adopted rules essentially the same as those for other projects. The Parties agreed that projects must increase actual net greenhouse gas removals by sinks "above the changes in carbon stocks in the carbon pools within the project boundary that would have occurred in the absence of the CDM afforestation or reforestation project." This is defined as the "actual net greenhouse gas removals by sinks" minus the "baseline net greenhouse gas removals by sinks" minus "leakage." "Actual greenhouse gas removals by sinks" are the actual removals due to the

project minus any emissions caused by the implementation of the project. Rules and definitions for "leakage" and the establishment of baselines are the same as for other CDM projects. Decision 5/CMP.1, paras. 1, 18–22.

6. The complexity of accounting for carbon from LULUCF raises a more general question about the effectiveness of the Kyoto Protocol approach: Does the complexity introduced by trying to include net emissions from LULUCF in the carbon market nullify the value of taking such a comprehensive approach to reducing greenhouse gas concentrations? What alternative policies and measures for LULUCF could the Parties adopt outside the carbon trading market set up in Kyoto?

IV. DEFORESTATION AND CLIMATE CHANGE

Deforestation remains an untapped element of climate change mitigation under the Kyoto Protocol. Yet, the climate change benefits of reducing deforestation are clear. Tropical forests, in particular, hold great value for climate change mitigation:

> Tropical forests account for slightly less than half of the world's forest area, yet they hold about as much carbon in their vegetation and soils as temperate-zone and boreal forests combined. Trees in tropical forests hold, on average, about 50% more carbon per hectare than trees outside the tropics. Thus, equivalent rates of deforestation will generally cause more carbon to be released from the tropical forests than from forests outside the tropics. Although the soils in temperate zone and boreal forests generally hold more carbon per unit area than tropical forest soils, only a fraction of this carbon is lost with deforestation and cultivation.

R. A. Houghton, *Tropical Deforestation As a Source of Greenhouse Gas Emissions, in* TROPICAL DEFORESTATION AND CLIMATE CHANGE 13, 15 (Paulo Moutinho & Stephan Schwartzman eds., 2005).

If deforestation can be arrested and reversed, the world's forests may play a significant role in mitigating rather than exacerbating climate change. According to the IPCC, the carbon mitigation benefits of reducing deforestation, at least in the short term, are greater than the benefits of afforestation, simply because of the scale of deforestation. In the long term, however, forest management that maintains or increases forest carbon stocks, while also producing sustainable harvests of forest products, should provide the largest sustained climate mitigation benefits. IPCC WORKING GROUP III, *Forestry*, at 543. As the IPCC acknowledges, however, many obstacles stand in the way of reversing deforestation rates and building sustainable forest management practices.

IPCC WORKING GROUP III, FORESTRY

543, 566, 569

Realization of the mitigation potential requires institutional capacity, investment capital, technology RD [research and development] and transfer, as well as appropriate policies and incentives, and international cooperation. In many regions, their absence has been a barrier to implementation of forestry mitigation activities. Notable exceptions exist, however, such as regional successes in reducing deforestation rates and implementing large-scale afforestation programmes. Considerable progress has been made in technology development for implementation, monitoring and reporting of carbon benefits but barriers to technology transfer remain. * * *

The causes of tropical deforestation are complex, varying across countries and over time in response to different social, cultural, and macroeconomic conditions. Broadly, three major barriers to enacting effective policies to reduce forest loss are: (i) profitability incentives often run counter to forest conservation and sustainable forest management; (ii) many direct and indirect drivers of deforestation lie outside of the forest sector, especially in agricultural policies and markets; and (iii) limited regulatory and institutional capacity and insufficient resources constrain the ability of many governments to implement forest and related sectoral policies on the ground. * * *

The lack of robust institutional and regulatory frameworks, trained personnel, and secure land tenure has constrained the effectiveness of forest management in many developing countries. Africa, for example, had about 649 million forested hectares as of 2000. Of this, only 5.5 million ha (0.8%) had long-term management plans, and only 0.9 million ha (0.1%) were certified to sound forestry standards. Thus far, efforts to improve logging practices in developing countries have met with limited success. For example, reduced-impact logging techniques would increase carbon storage over traditional logging, but have not been widely adopted by logging companies, even when they lead to cost savings.

Funding is another major hurdle. The *Stern Review on the Economics of Climate Change* has estimated that investments of US$5 to $15 billion per year are needed to reduce emissions from deforestation by 50 percent globally. The IPCC's estimate may be higher; it has reported that reducing emissions from deforestation by 50 percent could save 1,600 $MtCO_2$ annually at cost under $20/t CO_2eq. IPCC WORKING GROUP III, *Forestry*, at 543.

To overcome these challenges, a number of governments and nongovernmental organizations have turned to the climate change regime. Papua New Guinea and Costa Rica are credited with initiating formal discussions within the climate change regime in 2005 for providing compensation to developing countries for reducing emissions from deforestation. Their proposal led to a series of workshops to discuss how such a scheme might address leakage and non-permanence. It also led to intense negotiations about the structure of such a compensation scheme that included the following issues:

- Would this scheme create tradable emissions credits like CDM projects, or would

a compensation fund be established from bilateral and multilateral development assistance and other sources?

- How would countries with historically low rates of deforestation be treated?
- How would changes in deforestation rates be monitored and verified?
- How would forest governance be included in such a scheme, if at all?
- How would the rights of indigenous and local people be protected?

A. REDD+

The scheme quickly became known as REDD — Reducing Emissions from Deforestation and Forest Degradation in Developing Countries. When it became clear that REDD would include principles to improve forest governance and not simply be a mechanism for reducing deforestation, REDD became REDD+. REDD+ has enjoyed broad governmental support. Developed countries view REDD+ as a means to obtain cheap credits for meeting their commitments. Developing countries view it as a mechanism to compensate them for lost revenue from timber operations.

Although the REDD+ negotiations have been largely completed since the Cancun negotiations in 2010, a few critical issues remain unresolved. For example, the Parties are still trying to determine whether REDD+ should be a market-based regime in which "deforestation" credits could be traded (as with the CDM) or a fund-based mechanism through which government donors provide bilateral and multilateral aid to fund efforts that reduce deforestation or to pay developing countries when they meet specified deforestation reduction targets. Further, the Parties have struggled to identify appropriate environmental, social, and governance safeguards so that REDD+ activities 1) provide real and sustainable benefits to people, biodiversity and ecosystems, 2) support improved governance, 3) are effective and reduce the risk of non-permanence, and 4) are conducted with transparency, accountability, and full participation of affected stakeholders. As you read the relevant decisions below, identify how the Parties have addressed these issues and determine whether further work is needed.

Decision 1/CP.16, The Cancun Agreements: Outcome of the Work of the Ad Hoc Working Group on Long-term Cooperative Action under the Convention

FCCC/CP/2010/7/Add.1 (Mar. 15, 2011)

Affirming that, in the context of the provision of adequate and predictable support to developing country Parties, Parties should collectively aim to slow, halt and reverse forest cover and carbon loss, in accordance with national circumstances, consistent with the ultimate objective of the Convention, as stated in Article 2,

Also affirming the need to promote broad country participation in all phases described in paragraph 73 below, including through the provision of support that takes into account existing capacities,

68. *Encourages* all Parties to find effective ways to reduce the human pressure on forests that results in greenhouse gas emissions, including actions to address drivers of deforestation;

69. *Affirms* that the implementation of the activities referred to in paragraph 70 below should be carried out in accordance with appendix I to this decision, and that the safeguards referred to in paragraph 2 of appendix I to this decision should be promoted and supported;

70. *Encourages* developing country Parties to contribute to mitigation actions in the forest sector by undertaking the following activities, as deemed appropriate by each Party and in accordance with their respective capabilities and national circumstances:

    (a) Reducing emissions from deforestation;
    (b) Reducing emissions from forest degradation;
    (c) Conservation of forest carbon stocks;
    (d) Sustainable management of forests;
    (e) Enhancement of forest carbon stocks;

71. *Requests* developing country Parties aiming to undertake the activities referred to in paragraph 70 above, in the context of the provision of adequate and predictable support, including financial resources and technical and technological support to developing country Parties, in accordance with national circumstances and respective capabilities, to develop the following elements:

    (a) A national strategy or action plan;

    (b) A national forest reference emission level and/or forest reference level[6] or, if appropriate, as an interim measure, subnational forest reference emission levels and/or forest reference levels, in accordance with national circumstances, and with provisions contained in decision 4/CP.15, and with any further elaboration of those provisions adopted by the Conference of the Parties;

    (c) A robust and transparent national forest monitoring system for the monitoring and reporting of the activities referred to in paragraph 70 above, with, if appropriate,

[6] In accordance with national circumstances, national forest reference emission levels and/or forest reference levels could be a combination of subnational forest reference emissions levels and/or forest reference levels.

subnational monitoring and reporting as an interim measure,[7] in accordance with national circumstances, and with the provisions contained in decision 4/CP.15, and with any further elaboration of those provisions agreed by the Conference of the Parties;

(d) A system for providing information on how the safeguards referred to in appendix I to this decision are being addressed and respected throughout the implementation of the activities referred to in paragraph 70 above, while respecting sovereignty;

72. *Also requests* developing country Parties, when developing and implementing their national strategies or action plans, to address, inter alia, the drivers of deforestation and forest degradation, land tenure issues, forest governance issues, gender considerations and the safeguards identified in paragraph 2 of appendix I to this decision, ensuring the full and effective participation of relevant stakeholders, inter alia indigenous peoples and local communities;

73. *Decides* that the activities undertaken by Parties referred to in paragraph 70 above should be implemented in phases, beginning with the development of national strategies or action plans, policies and measures, and capacity-building, followed by the implementation of national policies and measures and national strategies or action plans that could involve further capacity-building, technology development and transfer and results-based demonstration activities, and evolving into results-based actions that should be fully measured, reported and verified; * * *

76. *Urges* Parties, in particular developed country Parties, to support, through multilateral and bilateral channels, the development of national strategies or action plans, policies and measures and capacity-building, followed by the implementation of national policies and measures and national strategies or action plans that could involve further capacity-building, technology development and transfer and results-based demonstration activities, including consideration of the safeguards referred to in paragraph 2 of appendix I to this decision, taking into account the relevant provisions on finance including those relating to reporting on support;

77. *Requests* the Ad Hoc Working Group on Long-term Cooperative Action under the Convention to explore financing options for the full implementation of the results-based actions[8] referred to in paragraph 73 above and to report on progress made, including any recommendations for draft decisions on this matter, to the Conference of the Parties at its seventeenth session;

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[7] Including monitoring and reporting of emissions displacement at the national level, if appropriate, and reporting on how displacement of emissions is being addressed, and on the means to integrate subnational monitoring systems into a national monitoring system.

[8] These actions require national monitoring systems.

* * *

Appendix I — Guidance and safeguards for [REDD]

1. The activities referred to in paragraph 70 of this decision should:

   (a) Contribute to the achievement of the objective set out in Article 2 of the Convention;

   (b) Contribute to the fulfilment of the commitments set out in Article 4, paragraph 3, of the Convention;

   (c) Be country-driven and be considered options available to Parties;

   (d) Be consistent with the objective of environmental integrity and take into account the multiple functions of forests and other ecosystems;

   (e) Be undertaken in accordance with national development priorities, objectives and circumstances and capabilities and should respect sovereignty;

   (f) Be consistent with Parties' national sustainable development needs and goals;

   (g) Be implemented in the context of sustainable development and reducing poverty, while responding to climate change;

   (h) Be consistent with the adaptation needs of the country;

   (i) Be supported by adequate and predictable financial and technology support, including support for capacity-building;

   (j) Be results-based;

   (k) Promote sustainable management of forests;

2. When undertaking the activities referred to in paragraph 70 of this decision, the following safeguards should be promoted and supported:

   (a) That actions complement or are consistent with the objectives of national forest programmes and relevant international conventions and agreements;

   (b) Transparent and effective national forest governance structures, taking into account national legislation and sovereignty;

   (c) 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 United Nations General Assembly has adopted the United Nations Declaration on the Rights of Indigenous Peoples;

(d) The full and effective participation of relevant stakeholders, in particular indigenous peoples and local communities, in the actions referred to in paragraphs 70 and 72 of this decision;

(e) That actions are consistent with the conservation of natural forests and biological diversity, ensuring that the actions referred to in paragraph 70 of this decision 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;[1]

(f) Actions to address the risks of reversals;

(g) Actions to reduce displacement of emissions.

Decision 2/CP.17
Outcome of the work of the Ad Hoc Working Group on Long-term Cooperative Action under the Convention
FCCC/CP/2011/9/Add.1 (Mar. 15, 2012)

63. *Agrees* that, regardless of the source or type of financing, the activities referred to in decision 1/CP.16, paragraph 70, should be consistent with the relevant provisions included in decision 1/CP.16, including the safeguards in its appendix I, in accordance with relevant decisions of the Conference of the Parties*;*

64. *Recalls* that for developing country Parties undertaking the results-based actions[1] referred to in decision 1/CP.16, paragraphs 73 and 77, to obtain and receive results-based finance, these actions should be fully measured, reported and verified,[2] and developing country Parties should have the elements referred to in decision 1/CP.16, paragraph 71, in accordance with any decisions taken by the Conference of the Parties on this matter;

65. *Agrees* that results-based finance provided to developing country Parties that is new, additional and predictable may come from a wide variety of sources, public and

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[1] Taking into account the need for sustainable livelihoods of indigenous peoples and local communities and their interdependence on forests in most countries, reflected in the United Nations Declaration on the Rights of Indigenous Peoples, as well as the International Mother Earth Day.

[1] In accordance with decision 1/CP.16, appendix II.

[2] As agreed by the Conference of the Parties.

private, bilateral and multilateral, including alternative sources;

66. *Considers* that, in the light of the experience gained from current and future demonstration activities, appropriate market-based approaches could be developed by the Conference of the Parties to support the results-based actions by developing country Parties referred to in decision 1/CP.16, paragraph 73…;

67. *Notes* that non-market-based approaches, such as joint mitigation and adaptation approaches for the integral and sustainable management of forests as a non-market alternative that supports and strengthens governance, the application of safeguards as referred to in decision 1/CP.16, appendix I, paragraph 2(c–e), and the multiple functions of forests, could be developed[.]

QUESTIONS AND DISCUSSION

1. Paragraph 73 of Decision 1/CP.16 describes the REDD+ process as including three distinct phases. The first phase involves the establishment of appropriate laws, regulations, and policies to implement REDD+. This may require developing institutional capacity to determine historic deforestation rates and establishing rules for engaging civil society and in particular indigenous peoples, among other things. In the second phase, governments implement the laws, regulations, and policies developed in the first phase. The third phase involves actual implementation of REDD+ projects, what paragraph 73 calls "results-based actions." The vast majority of developing countries are currently in the first phase of REDD+. As discussed in the next section, they are obtaining financing through bilateral and multilateral funds to undertake these "REDD readiness" actions in the first and second phases. No countries have begun issuing credits for a REDD+ project.

2. ***Market vs. Non-market Approaches.*** Deep divisions remain concerning whether REDD+ should be based on market principles (i.e., allowing emissions trading and CDM-like projects) or a non-market approach (i.e., a fund-based system in which developing countries are paid for meeting certain targets). Long-time observers of the REDD+ negotiations, Kate Dooley and Kate Horner, highlight some of the divisions:

> Brazil was clear that not all market approaches should be acceptable and proposed that specific mention of markets and non-market sources should be referenced with a footnote explaining that "appropriate" means exclusion of offsetting mechanisms and/or carbon markets. Support came from Tuvalu, Tanzania, Bolivia and Ecuador, but there was strong opposition from other Parties, leading to Brazil and Papua New Guinea coming up with a compromise text on the penultimate day of negotiations which formed the basis of the final text: "considers that, in the light of the experience gained from current and future demonstration activities, appropriate market-based approaches could be developed by the COP to

> support results-based actions by developing countries." Australia, backed by Japan, Norway and the US, attempted to add a last minute insertion allowing REDD+ offsets for national mitigation commitments to be developed outside the UNFCCC, but in the face of pressure from civil society, as well as the EU, Nicaragua and Ecuador, Australia withdrew its position.

Kate Dooley & Kate Horner, *FW Special Report – Durban Aimed to Save the Market, Not the Climate, December 2011*, EU FOREST WATCH 2 (Jan. 2012)

Supporters of a market-based approach point to the much larger financial benefits of such an approach. For example, if Brazil reduced deforestation by 10 percent against a baseline of average annual deforestation of about 20,000 km^2 for the 1980s, Brazil could earn $495 million per year, or $2.47 billion over five years based on a weighted average carbon price in 2004–2005 of $\$5.63/tCO_2$. Maria del Carmen Vera Diaz & Stephan Schwartzman, *Carbon Offsets and Land Use in the Brazilian Amazon, in* TROPICAL DEFORESTATION AND CLIMATE CHANGE, 96 (Paulo Moutinho & Stephan Schwartzman eds., 2005). According to these supporters, "[i]t is hard to envision that [Official Development Assistance] funds could increase to the hundreds of millions or even billions of dollars necessary to achieve large-scale reductions in emissions. It is even harder to envision why developed countries would invest in reducing deforestation emissions when those reductions would not be creditable and freely tradable in a global carbon market." Environmental Defense & Amazon Institute for Environmental Research, *Reducing Emissions from Deforestation in Developing Countries: Policy Approaches to Stimulate Action* 4–5 (Feb. 23, 2007). Do you agree? What are some of the advantages of a purely non-market-based compensation fund?

2. ***Value of Credits.*** The market-based approaches will only work if the price of sequestering carbon is greater than the income derived from alternative economic uses of the land, such as logging or farming. Further, because the price of different crops varies, the scheme may be economically attractive in some places and not in others. To stimulate the market and ensure that a significant level of funding is available to developing countries, Greenpeace has proposed that Annex I Parties must purchase a minimum number of "deforestation credits." To ensure the price remains high enough to encourage developing countries to take action to avoid deforestation, it has also proposed a cap on the supply of "deforestation credits." Bill Hare & Kirsten Macey, *Tropical Deforestation Emission Reduction Mechanism: A Discussion Paper* 4 (Greenpeace, Dec. 2007). Does this strategy provide an effective strategy for overcoming the potential shortcomings of market-based approaches?

3. One concern with providing tradable credits for avoiding deforestation is that the credit will be relatively inexpensive compared to other credits. That could reduce the value of credits under the CDM. In addition, there is deep concern that project-based efforts to avoid deforestation under the CDM will not be able to control for leakage and non-permanence or adequately establish baselines for additionality. As a result, many

view the country-wide, non-project-based approach of REDD+ as more feasible. Under this approach, developing countries would be compensated for reducing deforestation rates below an established baseline level of deforestation. even if Such an approach would be difficult to link to the CDM because it is not project based, although it could be linked to emissions trading if Article 17 of the Kyoto Protocol is amended to allow emissions trading with developing countries. To what extent should a system of compensation for avoiding deforestation be tied to existing Kyoto Protocol mechanisms, such as the CDM and emissions trading? In this regard, does it make any difference that the decisions on REDD+ have taken place within the UNFCCC, not the Kyoto Protocol?

4. ***Forest governance.*** An ongoing issue in the REDD negotiations has been whether REDD+ will promote sound forest management. For a large range of environmental groups, that has meant, among other things, ensuring that the REDD is not used to convert primary forests to plantations; if the REDD is only concerned with changes in carbon stocks, then a Party could convert a primary forest to a plantation with equal amounts of carbon and not report any deforestation. How do the REDD+ decisions address the conversion of primary forest to plantations? Is that permissible? If previously deforested land is reforested with a plantation, may a country claim this activity as reducing its deforestation rate? Is accounting based on gross or net deforestation?

5. ***Indigenous Rights.*** Indigenous peoples and other traditional users of forests are very concerned that the climate change regime will catalyze further incursions into their territories with limited consultation or participation from forest dwellers. In 2008, the Permanent Forum on Indigenous Issues noted that indigenous peoples did not support the REDD framework and that existing REDD proposals reinforce centralized top-down management of forests and undermine indigenous peoples' rights. Report of the Seventh Session of the Permanent Forum on Indigenous Issues, E/2008/43, E/C.19/2008/13, para. 45 (21 April–2 May 2008). The implementation of REDD+ pilot projects have justified their concerns. For example, one study concludes that

> very little security of tenure is provided to Indigenous People by Indonesia's domestic REDD+ legal framework and that this shortcoming is likely to result in poor protection of customary land rights under the REDD+ mechanism, regardless of the protection afforded by an eventual international agreement…. Strong tenure must be used as the basis for the interaction of Indigenous People with the REDD+ mechanism.

Glen Wright, *Indigenous People and Customary Land Ownership Under Domestic REDD+ Frameworks: A Case Study of Indonesia*, 7 LAW, ENV'T. & DEV'T. J. 117, 120 (2011). Similarly, researchers found that national REDD readiness planning activities in Cameroon

> lack effective actions to ensure the participation of indigenous peoples and local communities, miss solid data on the drivers of deforestation and gloss over critical land tenure, carbon rights and benefit sharing issues.

> The nine sub-national REDD projects currently underway lack transparency, meaningful participation or free, prior and informed consent (FPIC) and disregard issues of land tenure, customary rights and benefit sharing.

EMMANUEL FREUDENTHAL ET AL., REDD AND RIGHTS IN CAMEROON: A REVIEW OF THE TREATMENT OF INDIGENOUS PEOPLES AND LOCAL COMMUNITIES IN POLICIES AND PROJECTS (Forest Peoples Programme, 2011).

Review the UNFCCC REDD Decisions. What safeguards do they put in place to ensure that REDD supports indigenous rights? Do you think that these safeguards are sufficient? If not, what additional safeguards should be included? For further discussion of the relationship between climate change and human rights, see Chapter 10, Section V.

6. The climate change regime is rapidly becoming the most important international forest management regime, in part because governments have never been able to agree to a binding set of principles for sustainable forest management. Numerous global "dialogues" regarding forests have resulted in many non-binding statements or action plans. *See, e.g.*, Non-Legally Binding Authoritative Statement of Principles for a Global Consensus on the Management, Conservation and Sustainable Development of All Types of Forests, U.N.Doc.A/conf.151/26 (Vol. III), reprinted at 31 I.L.M. 881 (1992). But despite nearly two decades of negotiations, no binding forest conservation regime yet exists. Those regimes that do exist, such as the International Tropical Timber Agreement, are criticized for being primarily commodity agreements focused on expanding timber production and trade. The UN Food and Agricultural Organization has primary authority to address forests in the UN system, but it too views forests primarily as units of production. To what extent do you think the climate change regime will be an appropriate or effective forum for forest conservation? Can it adequately address the many, sometimes conflicting, non-carbon values of forests, such as wood production, biodiversity conservation, and protection of indigenous lands? Do any of the proposals outlined in this chapter address these non-climate values of forests?

B. REDD+ on the Ground

Although the UNFCCC's REDD+ regime is not fully agreed, much less operational, REDD-related activities and projects are underway in a number of countries. Moreover, countries have committed billions of dollars to REDD start-up activities through bilateral arrangements, the United Nation's REDD Program known as UN-REDD, and the World Bank's Forest Carbon Partnership Facility. UN-REDD, for example, helps developing countries prepare and implement national REDD+ strategies, helps empower countries to manage their REDD processes, and facilitates access to financial and technical assistance. For more on UN-REDD, see http://www.un-redd.org.

Similarly, the World Bank's Forest Carbon Partnership Facility (FCPF) has created a framework and processes for REDD+ readiness. Through the FCPF, participating countries can obtain technical and financial assistance in developing "REDD readiness" activities, such as establishing deforestation reference levels, adopting a REDD+ strategy, designing monitoring systems and setting up REDD+ national management arrangements, in ways that are inclusive of the key national stakeholders. A total of 26 countries have already prepared their Readiness Preparation Proposals, 19 of which have been formally assessed; three countries have received grants to implement these proposals. For more on the FCPF, see http://www.forestcarbonpartnership.org.

Bilateral arrangements have also been critical for getting REDD+ off the ground outside the climate change regime. Australia, Japan, Norway, and other countries have all established national level REDD+ programs. While none of these multilateral or bilateral programs create credits that are tradable through the UNFCCC's REDD+ mechanism or otherwise, countries do expect to claim credit for reducing their emissions through these programs. Recall that the bottom-up approach of the Cancun Agreement's pledges allows countries to establish their own standards for reducing emissions. Thus, a country's pledge to reduce emissions by a certain percentage may be based on carbon offsets in other countries. For example, the U.S. pledge to reduce emissions by 17 percent by 2020 is premised on legislation that allows large offsets in developing countries. *See* American Clean Energy and Security Act of 2009, H.R. 2454, 111th Cong. (2009) (allowing at least one billion tons of offsets from international sources).

Norway is perhaps the biggest player in REDD+. It has committed about US$1 billion on REDD+ activities in Indonesia over the next seven to eight years and US$214 million annually to support REDD+ efforts in Brazil and Tanzania. It has also provided US$30 million to Guyana to avoid deforestation, an amount that could rise to US$250 million through 2015. Although Norway has committed not to use these investments to offset its pledge to reduce domestic emissions 30 percent below 1990 levels by 2020, other countries may decide to do so.

Norway and other proponents of REDD are actively experimenting with pilot projects to test implementation of REDD. One of these, Norway's November 2009 deal with Guyana, known as the Guyana REDD-plus Investment Fund (GRIF), has come under intense scrutiny. Under the GRIF, Norway will pay Guyana if Guyana's deforestation rate is less than 0.45 percent. However, because Guyana's historic deforestation rate is well below that figure — 0.02 percent — Guyana will be allowed to increase deforestation rates. In fact, according to a report commissioned by the governments from Pöyry, a consulting firm, deforestation increased during the first year of the GRIF (2009-2010) by 200 percent. Yet, because Guyana's deforestation rate remained below 0.45 percent, Norway still paid Guyana US$40 million for its efforts. Since the Pöyry report, the GRIF partners have revised the program's payment structure so that progressive discounting will be applied to all payments if deforestation exceeds the current annual rate (of 0.06%). Furthermore, if rates increase to 0.1% — a figure which is still well below the reference level — Guyana will not receive any money at all.

The GRIF raises important questions about how to develop and evolve REDD projects. It also raises questions about how to encourage countries like Guyana with high forest cover but low deforestation rates (HFLD) to maintain those low deforestation rates. In fact, Norway and Guyana formed the GRIF partnership to build Guyana's capacity to resist drivers and deforestation pressures anticipated in the future, not to reduce current high deforestation rates. They also wanted to move forward now rather than wait for the UNFCCC negotiating process to complete its REDD mechanism.

Because the project was one of the first REDD pilot projects launched, and due to the skepticism surrounding the program, Guyana and Norway commissioned a certification group, the Rainforest Alliance, to assess Guyana's performance against a set of indicators intended to show the government's burgeoning capacity for forest governance, monitoring and conservation. A coalition of organizations, however, expressed concern that the verification made pivotal conclusions "while simultaneously acknowledging a lack of information on which to base an assessment." In addition, the coalition viewed the Rainforest Alliance's assessment of issues relating to indigenous peoples' rights and tenure as "superficial." Finally, they critics call into question the reports very independence, saying Rainforest Alliance "[declined] to either review important independent literature, or raise concerns regarding self-censorship and anonymity of persons interviewed." The coalition concluded by declaring its "overriding concern" as the failure of the Rainforest Alliance report to "provide an accurate picture of progress on the ground. It relies heavily on statements made by government officials and on government documents, rather than on independent verifications of those statements, or on the progress of the enabling activities." Letter to Hans Brattskar, Director, Norwegian International Climate and Forest Initiative, from Global Witness, et al (April 14, 2011). The Rainforest Alliance responded by noting delays in contracting and limits on how much could be spent on the actual verification. For details of the GRIF project, including criticisms of it, can be found at The GRIF website, http://www.guyanareddfund.org/. *See also* Chris Santiago, *Writing the Rules for a New REDD Paradigm: Norway and Guyana*, FOREST CARBON PORTAL (May 20, 2011) (providing a detailed overview of); Chris Lang, *Rainforest Alliance's "Inadequate Verification Report" in Guyana*, REDD-MONITOR (May 18, 2011).

Discussion and Questions

1. *GRIF Redux*. As part of the ongoing evaluation of the GRIF, the Joint Concept Note between Norway and Guyana has lowered Guyana's deforestation reference level to 0.275 percent and raised its historic deforestation rate to 0.03 percent. While deforestation rates continue to exceed Guyana's historic deforestation rates, Norway has made two payments totaling US$70 million. All project documents can be found at http://www.lcds.gov.gy/index.php/norway-partnership.

Do you think Norway and Guyana are handling the GRIF project appropriately by adapting the project as more information is gathered? For example, do you think that historical deforestation rates as performance benchmarks for HFLD countries like Guyana? The Rainforest Alliance defends its verification of the project by acknowledging logistical and financial difficulties. Under such constraints, what is the role of the verifier?

2. Refer to the UNFCCC REDD+ framework in Decision 1/CP.16 and Decision 2/CP.17. Do those decisions address the issue of "high forest, low deforestation" countries like Guyana? Do you agree that countries with relatively modest deforestation rates should be encouraged to participate by giving them a deforestation growth cap similar to the one Norway gave Guyana and not unlike the emissions growth cap that Australia was given in the Kyoto Protocol? If they are not rewarded with growth caps, how else could they be rewarded to prevent much higher rates of deforestation?

3. Whatever the status of the UNFCCC's REDD+, the market for forest carbon continues to grow. In 2010, land-based projects supplied the largest volume (28 $MtCO_2e$) of credits transacted on the voluntary market, with REDD projects constituting 29 percent of the credits transacted (by comparison, renewable energy and methane destruction each constituted 20 percent). MOLLY PETERS-STANLEY ET AL., BACK TO THE FUTURE: STATE OF THE VOLUNTARY CARBON MARKETS 2011 iv (June 2011). When non-REDD forest projects such as A/R CDM projects are added to the ledger, the 2010 forest carbon market climbs to 40 percent of credits transacted representing 75 $MtCO_2e$ with an estimated value of $432 million with "projects impacting more than 7.9 million hectares in 49 countries from every region of the world." DAVID DIAZ ET AL., STATE OF THE FOREST CARBON MARKETS 2011: FROM CANOPY TO CURRENCY i (Ecosystems Marketplace, Sept. 2011).

> The average price for offsets across the primary forest carbon markets rose from \$3.8/tCO_2e in 2008, to \$4.5/tCO_2e in 2009, and up to \$5.5/tCO_2e in 2010. Prices continue to vary widely across the regulated and voluntary markets, as each market transacts very different credits with unique supply- and demand-side drivers to go along with distinct project-level characteristics.… Prices reported for CDM forest credits fell slightly from \$4.7/tCO_2e in 2009 to \$4.5/tCO_2e in 2010, combined with a dip in volumes from 2009, leaving the market smaller this year compared to last.

DAVID DIAZ ET AL., STATE OF THE FOREST CARBON MARKETS 2011: FROM CANOPY TO CURRENCY i-ii (Ecosystems Marketplace, Sept. 2011).