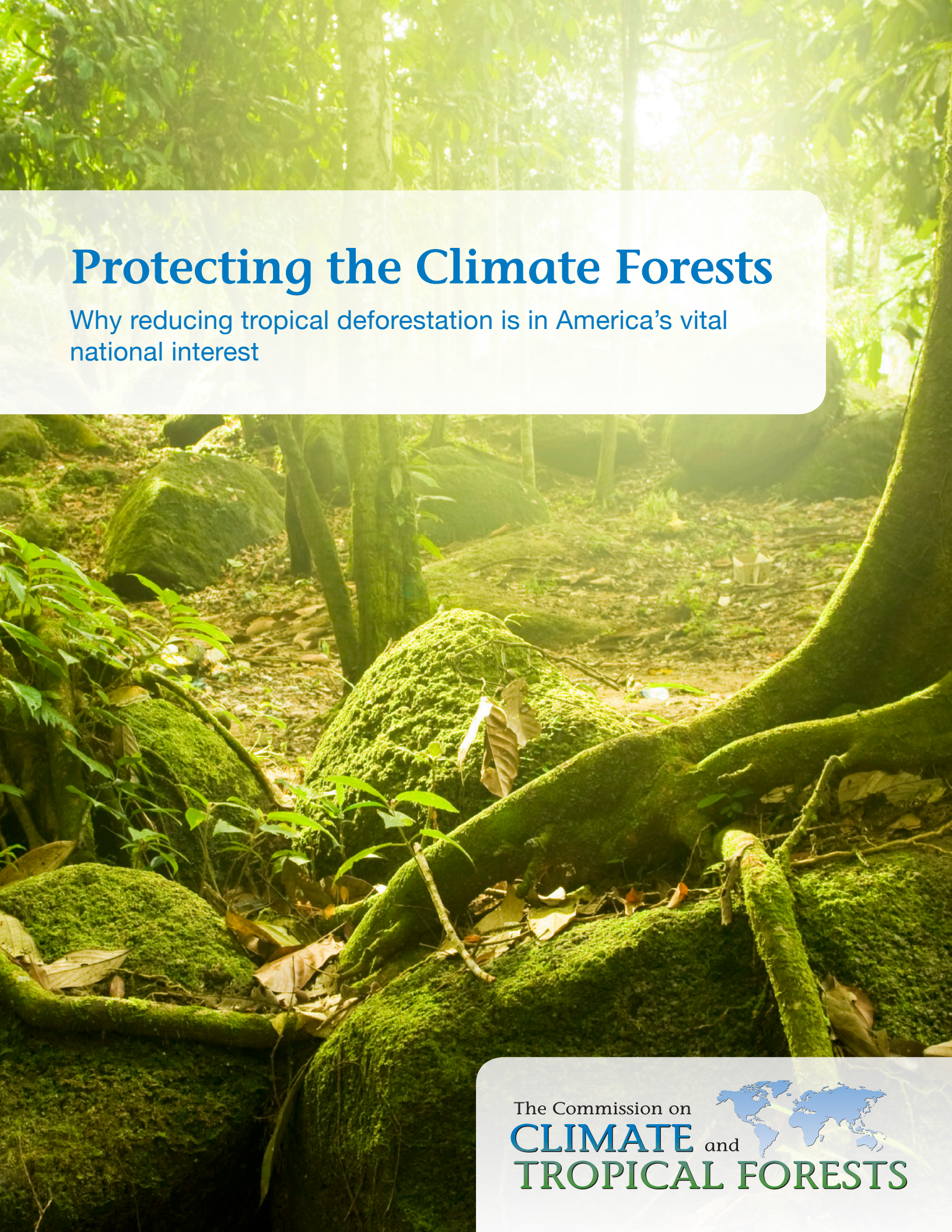

Protecting the Climate Forests

Why reducing tropical deforestation is in America's vital national interest

The Commission on
CLIMATE and
TROPICAL FORESTS

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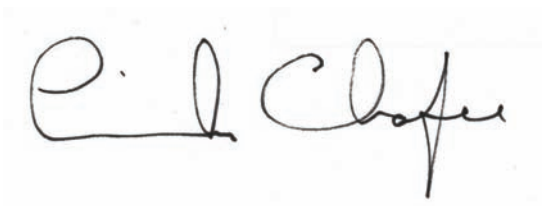
Foreword

The pace and severity of climate change are by now well established, and avoiding its worst effects will require coordinated global action to reduce emissions substantially, cost-effectively and without delay. Any new U.S. climate policies must help address the pervasive effects of deforestation, which accounts for 17% of global greenhouse gas emissions – more than the entire global transportation sector. Without incorporating robust tropical forest protections into new U.S. domestic climate laws and international agreements, all our other immediate efforts – to reduce emissions, expand clean energy and improve fuel efficiency – could be undermined by the continued destruction of the world's carbon-rich tropical forests. In fact, avoiding unacceptable risks of potentially catastrophic climate change is likely to prove nearly impossible without conserving the planet's "climate forests."

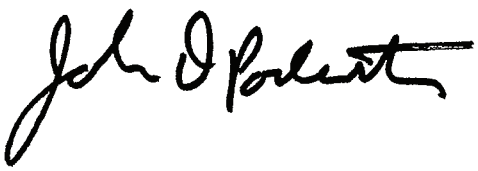
In cooperation with other interested nations, the United States must lead a global partnership to protect tropical forests, guided by the ambitious but feasible objectives of reducing emissions from tropical deforestation by half within a decade and achieving zero net emissions from deforestation by 2030. The severity of the threat we face demands immediate, bold and clear-headed action grounded in scientific realities and motivated by a full appreciation of U.S. economic, national security and environmental interests. Our nation must overcome the narrow political considerations of the moment to join in the most significant common project of our era.

The United States can rise to this great challenge. Our nation has a long history of bipartisan leadership on tropical forest conservation within and outside of global climate change negotiations. The American Clean Energy and Security Act of 2009 approved by the House of Representatives on June 26th has moved tropical deforestation into the mainstream of the U.S. climate policy debate. The bill would create groundbreaking tropical forest conservation mechanisms, backed by major new financial incentives and government resources. With debate on these and other proposals likely in the Senate in the weeks and months ahead, and with important global climate talks occurring this December in Copenhagen, Denmark, the time is right for America to focus on what it can do to galvanize a global partnership to protect tropical forests.

The Commission on Climate and Tropical Forests is a bipartisan group of former Senators, Cabinet officials, senior policy makers, and leaders from business, conservation, labor, global development, science and national security that has come together to help advise U.S. policy makers and the American people on how best to help reduce emissions from tropical deforestation. The Commission was formed in the spring of 2009 with the goal of laying out a workable path forward for Congress and the Administration on this crucial issue. The consensus findings, principles and recommendations contained in the accompanying report deliver on that promise and, if implemented, would lead to effective, politically viable protections for our planet's climate forests.



Lincoln Chafee, Co-Chair
Former United States Senator, Rhode Island



John Podesta, Co-Chair
President and CEO, Center for American Progress

About the Commission

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Former Chief of Staff, United States Army

Mark Tercek
CEO, The Nature Conservancy

Nigel Purvis, Executive Director
President, Climate Advisers

Mission

The Commission on Climate and Tropical Forests (the "Commission") was formed in the spring of 2009 with the goal of laying out a workable path forward to ensure effective and robust protection of tropical forests primarily as part of U.S. climate change policies, but also through engagement in international agreements. The intent has been to create actionable, politically viable recommendations that can inform and guide the United States in its challenging legislative and diplomatic negotiations on this crucial issue.

Deliberations

The Commission's report is the product of extensive analysis, careful deliberations, international fact-finding and consensus decision-making. In addition to participating in the Commission's in-person meetings, Commission members also met with international policy makers, received extensive briefings and met with leading experts.

In August 2009, a number of Commission members traveled to Brazil to learn more about its national and local efforts to reduce deforestation. They met with leading policy makers and environmental NGOs, as well as local stakeholders, including ranchers, farmers and labor leaders. Commissioners also joined world leaders at the United Nations in September 2009 for discussions about emerging international efforts to help developing nations conserve tropical forests.

Several members of the Commission contributed years of first-hand experience working on climate policy and tropical forest conservation. Other members represent companies and non-governmental organizations that have pioneered climate-related investments to reduce tropical deforestation for more than a decade. Some members had less background on the topic at the start but contributed their time, energy and breadth of experiences in other relevant areas, such as foreign policy, national security, international development, science, business and politics.

Assumptions

The Commission based its findings, principles and recommendations on the consensus findings of U.S. and international climate scientists. In crafting its policy recommendations, the Commission assumed that for the time being climate policy discussions in the United States would continue to center on "cap-and-trade" proposals, under which the Federal government would set emission limits (cap) but allow regulated companies the opportunity to reduce costs by buying and selling emission allowances (trade). Cap-and-trade is the centerpiece of the American Clean Energy and Security Act, approved by the House of Representatives on June 26, 2009. It is also the approach endorsed by President Obama, and is expected to be the focus of Senate debate in the months ahead. The prospects for a national, economy-wide cap-and-trade bill in the Senate remain uncertain. The focus given to cap-and-trade by the Commission reflects the current political context. Because the possibility of a cap-and-trade program is real, the Commission has developed specific recommendations that would allow the United States to harness that approach to help reduce tropical deforestation.

Support

The Commission is supported in part by grants from the David and Lucile Packard Foundation to Climate Advisers, the Glover Park Group and Meridian Institute. Climate Advisers directs policy analysis, the Glover Park Group offers strategic communications guidance and support, and Meridian Institute provides process design, facilitation and logistics support.

Acknowledgements

The Commission is grateful for the assistance it received from many quarters. The preparation of this report was a team effort that could not have been accomplished as effectively as it was without the help of the individuals and organizations listed below.

Nigel Purvis, the Commission's Executive Director and President of Climate Advisers, guided the Commission through the complexities of climate and tropical forest policies, and helped the Commission find a strategic focus. Andrew Stevenson of Climate Advisers and Resources for the Future served expertly as the Commission's lead researcher and this report benefited immeasurably from his contributions.

John Ehrmann, founding partner of the Meridian Institute, expertly facilitated the Commission's deliberations. In addition to substantive input, Meridian provided administrative and logistical support. Shelly Foston, Kerri Wright Platais and Shawn Walker of the Meridian Institute were tireless and ultra-professional throughout the process.

Within the Glover Park Group, Ryan Cunningham skillfully led a diverse and talented communications team, which included Ben Becker, Matt Bevens, Carley Corda, Sara Sidransky, Alissa Ohl and Jason Miner. The Commission's report benefited significantly from their creativity and hard work.

A number of outstanding professional staff supported the Commissioners, including Andrew Light of the Center for American Progress, Marty McBroom of American Electric Power, Eric Haxthausen and Rane Cortez of The Nature Conservancy, and Charles Stamp and Vanessa Stiffler-Claus of John Deere. These individuals played a major substantive role in the preparation of this report.

The David and Lucile Packard Foundation provided generous support. The Foundation's senior adviser for tropical forests, Dr. Daniel Zarin, contributed strategic advice and scientific expertise from start to finish. He also helped the Commission interact with leading international policy makers. Dr. Walter Reid of the Foundation was an early and consistent champion of this project.

Several international climate and forest experts provided helpful background information and answered the Commission's policy questions, including Per Pharo of Norway, Tasso Azevedo of Brazil and Howard Bamsey of Australia. Charles McNeil of the United Nations Development Program helped the Commission interact with world leaders to discuss tropical forests and climate policy during the United Nations General Assembly in September 2009.

The Nature Conservancy's climate change and South America teams facilitated a visit to the Amazon region by several members of the Commission. The Commission thanks Mark Tercek, Joe Keenan, Sarene Marshall, Eric Haxthausen, Ian Thompson, Jill Bernier, José Benito Guerrero, Angélica Toniolo, Sanés Bissochi and Francisco Fonseca for making this trip to the tropical forest frontier so educational and successful.

Dr. Douglas Boucher of the Union of Concerned Scientists, Dr. Ray Kopp of Resources for the Future and Dr. William Boyd of the University of Colorado Law School reviewed early drafts of background material prepared for the Commission. The ClimateWorks Foundation, through Project Catalyst, shared helpful analysis. Adrian Deveny of Resources for the Future provided early modeling results from the Forest Carbon Index. Finally, Adrian Deveny, Rachel Saltzman and Brad Tennis offered timely research support.

Core Messages

- The United States should help lead a global partnership to halve greenhouse gas emissions from tropical deforestation by 2020 and reach zero net emissions from deforestation by 2030 – an ambitious but achievable goal.

- Solving the climate crisis will be nearly impossible without urgent efforts to stem tropical deforestation, which accounts for approximately 17 percent of global greenhouse gas emissions and represents the best opportunity for quick, large-scale and cost-effective emission reductions.

- Well-designed incentives to halt tropical deforestation would also strengthen U.S. national security by reducing international instability, help alleviate global poverty and conserve priceless biodiversity.

- To catalyze global climate action and maximize the benefits of reducing deforestation, the United States should begin by investing at least $1 billion in public funding prior to 2012. In addition, the U.S. policy should mobilize roughly $9 billion annually by 2020 from the private sector to reduce tropical forest emissions. Doing so could help reduce climate costs faced by U.S. companies by up to 50 percent, saving up to $50 billion by 2020 compared to domestic action alone. Furthermore, public sector investments should increase gradually to $5 billion annually by 2020 to unlock these cost savings and reduce deforestation in nations that cannot attract private capital.

Summary for Policy Makers

Findings

Climate change is a major and growing threat to the United States and the world. The United States must marshal an effective, timely global response.

The consensus scientific view is that global average temperature increases ought not to exceed 3.6°F (2°C) above pre-industrial levels to avoid unacceptable risks of dangerous climate change. Achieving this target requires reducing global emissions by 50 percent by 2050, with industrialized nations reducing emissions 80 percent or more and developing nations taking increasingly ambitious actions in the same time frame.

Achieving these emission reductions cost-effectively will be nearly impossible without a substantial reduction in tropical deforestation before 2020 and achieving zero emissions globally from the forest sector by no later than 2030. According to the Nobel Peace Prize-winning Intergovernmental Panel on Climate Change, deforestation accounts for approximately 17 percent of global emissions, more than the entire global transportation sector. It is one of the few major sources of emissions that can be addressed cost effectively now, thereby giving the world time to transform the global energy economy with innovative new technologies and practices in electricity, infrastructure, transportation and manufacturing.

Commissioner Perspective:

LINCOLN CHAFEE, Co-Chair

Former United States Senator, Rhode Island

"Climate change has become a defining issue of our time, a challenge to the world community to act cooperatively on a threat to our planet. Climate change has the potential to forever alter our way of life. Tropical deforestation plays a central role, responsible for 17 percent of global greenhouse gas emissions. It is truly time for America to launch a comprehensive response to this manageable threat. Protecting the planet's climate forests and fighting climate change can be the defining bipartisan issue of our time, but so far that bipartisanship has been largely absent. The Commission strongly urges our elected leaders to recognize the obligation we have and embrace this opportunity for collaboration. Time is running out, and our actions now will have implications for generations to come."

While planting forests will make sense in many places, avoiding the conversion and degradation of standing forests will produce the greatest climate, national security, economic and biodiversity benefits on the global scale, and thus should be the primary focus of U.S. policy.

Commissioner Perspective:

JOHN PODESTA, Co-Chair

President and CEO, Center for American Progress

"Climate change is a challenge unlike any we've ever seen, demanding strong domestic policies and vigorous global leadership from the United States. That means effective near-term solutions at both the national and international levels that fundamentally change our environment's dangerous trajectory. Addressing tropical deforestation needs to be a central focus of that effort. Slowing and stopping the destruction of our tropical forests will massively reduce CO_2 emissions and create paths toward sustainable global development. The Commission strongly urges the U.S. to enact strong domestic climate policy and lead an international effort to provide sufficient resources to ensure tropical deforestation is addressed. We must accomplish this goal. Our common future depends on it."

The United States has much to gain from leading a global partnership with other nations to enhance tropical forest conservation. An effective and coordinated effort would:

- Provide incentives for developing nations to reduce a major source of their emissions and adopt sustainable, low-emission land-use practices;
- Reduce the cost of implementing climate policies by

funding less-costly action in developing nations in lieu of more-costly domestic opportunities, allowing the United States to focus on the opportunities climate policy presents to spur economic growth, develop and deploy new technologies, create jobs and make U.S. firms more competitive;

- Strengthen national security by reducing instability from climate change and local environmental degradation, which are threat multipliers for social conflict, ethnic strife, civil violence and armed conflict in weak and failing states;
- Contribute to alleviation of global poverty by channeling substantial new revenues to the rural poor who depend on tropical forests and by reducing the climate vulnerability of poor communities to drought, flooding and severe storms; and
- Conserve valuable biodiversity and ecosystem services by protecting some of the world's most important natural places and productive ecosystems.

To reap the economic, security and environmental benefits of reducing emissions from tropical deforestation, the United States must ensure that new programs improve local living standards and promote sustainable development objectives in tropical forest nations. New strategies are unlikely to succeed without local ownership, technical assistance and new financial incentives. Large-scale financial incentives can help developing nations move from underdevelopment to prosperity in ways that avoid deforestation, similar to the "leap frogging" many developing nations have done in communications or information technology.

Some tropical, forest countries are already reducing their deforestation rates. As one example, in 2008 Brazil set an ambitious target of reducing its deforestation rate in the Amazon region 80 percent below its 1996-2005 historical average by 2020. Emissions have been substantially reduced in the Amazon region since 2004, although it is too early to say if this progress will prove durable in Brazil. Deforestation rates in many other tropical forest nations remain troublingly high.

Reducing deforestation will require a strong partnership among developed and developing nations. Financing for reducing emissions will be most productive if it is focused on the financial and technical assistance needs of developing nations that commit to reduce deforestation through ambitious domestic actions. Success depends on fundamentally altering the financial incentives that traditionally drive deforestation, such as income from farming, ranching and logging. Global funding needed to make these changes is estimated at $2 billion in 2010 growing to $30 billion per year by 2020. Public and private investments are both needed to support the different phases of action from initial planning to verified reductions, and to engage the widest possible range of countries.

Principles

The United States should make reducing tropical deforestation a centerpiece initiative in domestic climate policy and international climate diplomacy, in parallel with committing to prudent, cost-effective domestic emission reductions. **U.S. policy should be based on the following foundational principles:**

- **International partnerships.** The United States must work in partnership with developing and developed countries to create and implement effective and timely approaches, including through new multilateral and bilateral climate agreements.

- **Environmental integrity.** Rigorous environmental standards are required to ensure that emission reductions are genuine and additional to existing efforts, as well as to protect against unintended ecological, economic and social outcomes.

- **Payment for performance.** The United States must link payments to demonstrated performance. Developing nations that succeed in reducing tropical deforestation should be rewarded, thereby encouraging further progress in those countries and creating the right incentives for others. To sustain U.S. domestic political support for major tropical forest conservation expenditures, the American

people must have assurances that U.S. programs achieve measurable, verifiable results.

- **Cost-effective solutions.** While emission reductions from tropical forests are cost-effective, they will require investments of both technical and financial resources. Capitalizing on cost-effective opportunities will be essential to safeguard the U.S. economy and secure the greatest return on investment for every dollar spent. Sound policy frameworks that mobilize both public and private investment capital for their best uses are also needed to achieve emission reductions at scale and leverage contributions from other countries.

To succeed, U.S. policies to reduce tropical deforestation must be implemented in a manner that promotes:

- **The sustainable development objectives of developing nations.** To secure the local cooperation and support that is essential for success, forest conservation programs must help to improve living standards in developing nations in ways that are consistent with low-carbon growth strategies.

- **Other U.S. foreign policy goals.** Forest conservation policies must strengthen relationships with key allies and other nations, and promote a range of important national interests in addition to climate change mitigation, including international stability, national security, biodiversity conservation and the protection of critical ecosystems.

- **Equitable incentives for forest-dependent communities, including the indigenous.** The United States must ensure that forest-dwelling communities, the rural poor and other vulnerable populations who depend on forests benefit financially from climate-related forest conservation policy frameworks. This is both a moral imperative and a practical necessity to secure local cooperation.

- **Ambitious U.S. domestic policies.** Efforts to reduce deforestation must balance (not displace) ambitious immediate efforts to reduce emissions within the United States. Strong domestic action is essential to secure an effective global response to climate change.

Recommendations

The Commission's recommendations are divided into three sections. The main recommendations appear first, followed by a set of more specific implementation recommendations. Recommendations in these first two sections are intended to inform U.S. climate policy without regard to the specific design of domestic emission control policies. In contrast, the third set of recommendations contains the Commission's views on how the United States could reduce tropical deforestation within a Federal "cap-and-trade" program. The political context and rationale for these final recommendations are discussed further below.

Main Recommendations

Recommendation 1: With other nations, the United States should lead a global partnership to cut emissions from tropical deforestation in half within a decade and achieve zero net emissions from the forest sector by no later than 2030. Halving total global emissions by 2050, as science indicates is necessary to reduce the risk of dangerous climate impacts, will not be possible without dramatic early reductions in tropical deforestation. Reducing deforestation can help make climate policy affordable and buy time for nations to develop and implement better energy technologies and practices. Halving emissions from tropical deforestation by 2020 and eliminating them by 2030 will not be easy, but it is feasible with a well-designed strategy and ambitious efforts. Supporting Brazil's efforts to sustain and build upon recent reductions in deforestation will be essential because Brazil is more prepared than perhaps any other nation to demonstrate real results. However, success also depends on unlocking mitigation potential in Indonesia, Malaysia and the Congo Basin, as well as in emerging economies throughout Latin America, Southeast Asia and Africa. New bilateral and multilateral agreements will be needed to help these nations develop credible plans, implement much-needed forest-sector reforms and to incentivize and verify emission reductions.

Recommendation 2: The United States should create major new financial incentives and public-private partnerships to encourage forest conservation by developing nations and to finance emission reductions that the United States would otherwise have to make via far more costly domestic strategies. Substantially reducing and then halting deforestation globally will not be possible without fundamentally altering the financial incentives that forest clearing provides for landowners and forest-dependent people. The United States can benefit by complementing domestic emissions mitigation programs with affordable investments in tropical forest conservation that alter the balance of financial incentives in favor of forest conservation.

Recommendation 2.1: To unlock these savings, the United States should invest at least $1 billion before 2012 in programs that would build the capacity of developing nations to reduce forest-sector emissions. Much work lies ahead. Assuming that developing nations already have the needed capacity for action would be unwise given the economic and environmental importance of significant, early tropical forest emission reductions and the challenges many developing nations now face in reforming their forest sectors. New U.S. foreign assistance funds are needed for this capacity building work until more sustainable private sector financing can be mobilized through new climate change policy frameworks. A $1 billion investment would represent no more than 25 percent (and probably much less) of the at least $4 billion urgent global need for immediate capacity building assistance in developing nations. The climate change bill approved by the House of Representatives in June 2009 would provide no immediate financing for tropical forests, so new options and leadership are particularly needed from the Senate and the Obama Administration.

Recommendation 2.2: Looking further ahead, the U.S. policy should mobilize roughly $14 billion annually by 2020 for tropical forests from a combination of public and private sources, since doing so could help reduce climate costs faced by U.S. companies by up to 50 percent compared to domestic action alone. These additional resources are needed to help forest-rich developing nations with low deforestation rates to avoid increases in deforestation caused by mounting economic pressures, to support forest conservation in countries that cannot attract private capital given perceived investment risks and to purchase verified emission reductions. The sum is a reasonable estimate calculated to achieve a rough balance between domestic and international mitigation, and consistent with both the ambitious goals in this report and recent analyses of U.S. legislative proposals by the Congressional Budget Office and Environmental Protection Agency. Roughly two-thirds of these resources should come from the private sector under a well-designed policy.

Recommendation 3: The United States should adopt strong domestic climate change laws that reduce U.S. emissions 80 percent by 2050 and contain interim goals consistent with climate science, thereby helping to galvanize ambitious international action. Significant and timely reductions in U.S. emissions are essential to catalyze an effective global response. Long-term goals should be supported by cost-effective programs that ensure the United States meets ambitious and achievable medium-term emission reduction objectives and give the American people and the world confidence that the United States is committed to action.

Implementation Recommendations

Recommendation 4: The United States should work to ensure that international agreements with tropical forest nations secure actions by those nations that support global emission reduction goals for forests. Strong domestic climate legislation would create a sound basis for the United States to ask for greater efforts from other nations, including through international climate agreements. International agreements that do not help developing nations move aggressively toward reducing global emissions from forests by 50 percent in 2020 and zero net emissions from forests no later than 2030 have the potential to be counterproductive. Clear and appropriately ambitious quantitative goals should be backed by credible and enforceable national plans. Over time, U.S. funding should be increasingly targeted to developing nations that are meeting ambitious goals. One way to frame this linkage would be to focus

resources on nations with effective means to achieve (or at least show substantial progress toward) zero net deforestation within a certain timeframe. Yet, making it too difficult for developing nations to qualify for U.S. financial assistance would reduce their incentive for action, potentially increasing the cost of the United States securing any set quantity of emission reductions in a fixed time. Thus, environmental objectives must be realistic and reflect the diversity of national circumstances.

Recommendation 5: U.S. policies should provide incentives for countries to move to national-scale action as quickly as possible. The United States should give preferential access to financial incentive programs and carbon markets to developing nations that have adopted national emission reduction objectives covering their entire forest sector ("sector-wide approaches") as a means of encouraging nations to move swiftly to national-scale actions. Focusing U.S. financial incentives in this way would reward nations that are taking ambitious action, encourage nations to pursue large-scale policies and prevent the shifting of deforestation from one place to another. At the same time, policy frameworks must recognize that many developing nations will require time to develop capacity to implement national-scale forest conservation initiatives. Unrealistic assumptions about how quickly developing nations can act could undermine international emission reduction efforts and increase the cost of U.S. climate policy by failing to deliver much-needed international emission reductions. U.S. policies, therefore, should provide incentives for capacity building activities in developing nations that will speed up the transition to national-scale approaches. These nations should have opportunities to participate in U.S. programs on the basis of action at a scale below the national level for a limited period of time. For example, during this transition period, and subject to international agreements with specific developing countries, major emitting tropical forest nations should have opportunities to participate in U.S. programs on the basis of state- or province-wide programs. Special accommodations should be made for least developed countries, which are likely to need the most time to acquire the capacity to pursue national deforestation strategies.

Recommendation 6: The United States should work to ensure that international agreements and financial incentive programs place special emphasis on transparent and credible procedures for evaluating whether local people are participating in and benefiting from new policy frameworks. The United States should support tropical forest nations in their efforts to develop transparent and credible procedures for making land-use decisions, consulting local communities and reporting on the impacts of forest conservation programs. With the help of civil society actors, governments will be able to assess these reports, determine whether appropriate procedures are being followed, and hopefully avoid unintended consequences. National reporting and international review should occur periodically to promote understanding, evaluation and constant improvement of the social and economic effects of forest conservation programs on the 1.6 billion forest-dependent people in the developing world.

Recommendation 7: The United States should channel new forest conservation investments to high-priority areas for national security, poverty alleviation and biodiversity conservation. Not all forests are equally important to the United States and climate policy should reflect this. The rainforests in the Amazon-Andes region are teeming with wildlife and biodiversity of international significance. The forested watershed that enables transit across the Panama Canal, for example, is of global economic and security significance. Conserving that watershed in ways that make the Canal more secure, sustainable and affordable, as existing U.S. policies seek to do, is in our national interest. The Executive Branch should report to Congress on the measures it is taking to focus U.S. funding in ways that maximize climate, national security, economic development and biodiversity benefits.

Recommendation 8: The United States should establish a coordinating council and designate a lead office or agency to oversee tropical forest conservation programs. The success of U.S. international forest conservation programs may depend on whether the United States government organizes itself appropriately to manage these complex multi-billion-dollar efforts. Responsible agencies will need the authority and expertise to perform many diverse functions, including developing environmental

standards, negotiating international agreements, implementing technical assistance programs in developing nations, managing large new funds and possibly regulating and intermediating financial markets. No existing U.S. department or agency has the capacity, experience and expertise needed to fulfill all of these functions. The United States should develop an integrated "whole of government" approach by tapping into the expertise and authorities of all relevant agencies. However, there is the significant risk that by dividing responsibility across the government, implementation of key programs could occur in a haphazard, uncoordinated manner, with different agencies working at cross-purposes. Given the size, complexity, and importance of the task, the U.S. government needs a single coordinating council separate from all existing agencies to lead the development of new strategies, plans and budgets. The White House should create such a council to serve this coordinating function because a united effort that harnesses relevant expertise, capacity and authorities across the federal government is absolutely essential. The White House should also designate a lead office or agency to head the coordinating council. One option would be to appoint a senior official within the White House to chair the coordinating council. Another option would be to make an existing department or agency the lead coordinating entity.

Recommendation 9: The United States should promote a global transition to full terrestrial greenhouse gas emission accounting. Forests, food, biofuels and fiber production compete for a finite land area in developing nations. Tropical forest loss, the principal source of terrestrial emissions, is driven by that competition as tropical forests are turned into farmlands and rangelands, or harvested for timber. If global demand for food achieves its projected doubling by 2050, nations will need to rehabilitate degraded lands and intensify food production at a rate well beyond current gains. Reducing emissions from deforestation ultimately will require the world to meet competing land-use demands as efficiently as possible. Toward this end, the United States should promote a comprehensive system of terrestrial carbon management that accounts for greenhouse gas emissions from forests, rangelands, agriculture and other major land-use categories. Continued scientific and technological improvements in the ability to reliably measure, monitor, and detect changes in terrestrial carbon stocks will be essential, although many existing technologies are impressive and need to be deployed and adopted far more broadly. U.S. investments in satellites and remote sensing, for example, should account for those needs, and findings should be declassified as appropriate and made widely available. Early international efforts should focus on improving procedures for measuring, monitoring and verifying greenhouse gases across all land-use types, including in greenhouse gas-rich peatlands and other soils. The challenges associated with these tasks should not be used as justification for inaction or delay in reducing tropical forest emissions quickly now.

Cap-and-trade Recommendations

The climate policy debate in the United States is currently focused on the pros and cons of what is known as a cap-and-trade program. Under a national cap-and-trade program the Federal government would limit ("cap") domestic emissions and seek to reduce compliance costs by allowing regulated businesses the flexibility to buy and sell ("trade") emission allowances and to invest in international emission reduction activities ("offsets") in lieu of reducing their own emissions. Over a dozen states, including California and New York, have already begun implementing regional cap-and-trade programs. Prior to his inauguration President Obama called on Congress to enact a national cap-and-trade law. A cap-and-trade program is the centerpiece of the climate bill approved by the House of Representatives in June 2009, and the Senate is expected to examine similar approaches in the days and months ahead. A well-designed cap-and-trade program would provide an effective mechanism for financing and implementing the recommendations articulated in this Summary. However, the prospects for (and timing of) Senate approval of a national, economy-wide cap-and-trade bill are quite uncertain. Because the possibility of a cap-and-trade program is very real, the Commission has developed these specific recommendations that would allow the United States to harness that approach to help reduce tropical deforestation.

Recommendation 10: The United States should allocate 5 percent of the value of tradable emission allowances in a cap-and-trade program to new international forest conservation programs. Substantial public funding is necessary to help developing countries build capacity to participate in markets and deliver verified emission reductions, especially in nations that present risks that may limit private sector investment and those that still have large standing forests but limited deforestation. Government estimates indicate that in the context of an affordable cap-and-trade program a 5 percent allocation would generate $3.1 billion in 2012, rising to $5.1 billion by 2020. The climate change bill approved by the House of Representatives in June 2009 would set aside 5 percent of emission allowances for international forest conservation. A Senate cap-and-trade bill should do likewise.

Recommendation 11: To mobilize private capital, the United States should permit regulated U.S. companies to "offset" a substantial portion of domestic emissions through investments in tropical forests. In this manner, the U.S. policy should mobilize (within the overall funding need referenced in Recommendation 2 above) roughly $9 billion annually from private investment to save U.S. companies up to $50 billion by 2020 compared to domestic action alone. These offsets would help control the costs of a U.S. cap-and-trade program while new clean energy technology is developed and deployed. The U.S. Environmental Protection Agency (EPA) predicts that international offsets would reduce the cost of climate action faced by U.S. companies by almost 50 percent, and most studies project that a majority of cost-effective offsets would come from tropical forests. The House climate bill would allow companies to use a significant number of tropical forest offsets, and the Senate should take a similar approach if it adopts cap-and-trade legislation.

Recommendation 12: The pool of emission allowances set aside to help control the cost of a new cap-and-trade program (the "strategic reserve") should be large enough to manage the risk that the supply of forest carbon "offsets" may prove insufficient to stabilize prices and avoid price spikes. New international forest conservation programs in a cap-and-trade program will only work if the entire cap-and-trade program succeeds and thus continues to finance U.S. investments in reducing tropical deforestation. This in turn depends on forest programs helping to genuinely reduce emissions and contain the cost of the cap-and-trade program. While this strategy holds great promise, the United States should guard against potential economic risks of relying too heavily on emission reductions from international forests. Few developing nations today are fully prepared (including technically and administratively) to participate in U.S. carbon markets. This raises the possibility that in the initial years of a cap-and-trade program, demand for international forest carbon offsets could very well exceed available supply, increasing the risk of high prices. The climate bill approved by the House creates a strategic reserve of emission allowances that companies can access if market prices climb above a predetermined level. To be effective, the strategic reserve needs to be large enough to account for the possibility that the supply of forest carbon offsets could be insufficient to control costs in a particular period. Similarly, the United States needs to avoid relying too heavily on the notion that it will "refill" the strategic reserve (for future use) with tropical forest emission reductions. If low forest carbon supply is the cause of high prices, tropical forest emission reductions simply may not be available to refill the strategic reserve before the reserve runs dry. The House climate bill sets the size of the strategic reserve at 2.7 billion tons of carbon dioxide. More analysis is needed to determine the right role for tropical forest emission reductions in refilling the strategic reserve and to determine its optimum size.

Recommendation 13: The United States should explore and consider establishing a financial intermediary to aggregate forest carbon offset demand and supply. U.S. corporations could continue to have the option of purchasing forest carbon offsets directly from developing country partners, but they should have the additional choice of purchasing these offsets directly from a U.S. government entity. A forest carbon market with no intermediary would likely result in unnecessarily high costs for private companies. In contrast, an entity making bulk purchases on behalf of American companies could reduce costs and achieve greater emission reductions for every dollar spent.

Importantly, the offset aggregator should be a public entity (or at least have a public charter). While a private sector aggregator would probably emerge in the absence of a government entity (indeed, such entities are already in existence in the voluntary carbon markets), only a public entity would direct 100 percent of the savings into lowering costs for regulated companies and securing the maximum emissions mitigation by developing nations for every dollar spent. In contrast, a private sector aggregator would likely try to maximize its profits by retaining for itself as much as possible between the price companies would be willing to pay and the lower price it negotiates with developing nations. In addition, a government entity may be needed to finance emission reductions from Brazil and other nations that may choose not to participate in U.S. carbon markets, or to engage other categories of nations that fail to attract private capital. A government-based forest carbon offset aggregator also would be well-positioned to ensure the environmental integrity of offsets entering the United States. With the government verifying emission reductions and monitoring implementation, moreover, U.S. companies could avoid exposure to the reputation and business risks associated with tropical forest sector investments in faraway regions about which they may have very little information.

Climate Change and Tropical Forests

A Global Challenge

Climate change is a serious and urgent threat to the United States and the world, and its adverse impacts are already being felt at home and abroad (see Figure 1). Future climate threats to the United States include more common and intense hurricanes, floods and droughts, increased risk of death from extreme heat, epidemics of pests and diseases, and decreased crop yields with high levels of warming. Some of these impacts will be much more severe in certain regions, including flooding in the Southeast and changing precipitation patterns in the Southwest.[1] Internationally, climate change acts as a "threat multiplier" against U.S. national security and humanitarian interests.[2] Climate-induced floods may impact as many as 94 million people by the end of the century and result in large population migrations. By 2020, 75-250 million people may face climate-related water shortages, with Africa suffering disproportionately. In some African countries, yields from rain-fed agriculture could be reduced by up to 50 percent over the same period. As a consequence of these climate impacts up to one billion people risk falling back into extreme poverty, with serious implications for the United States and the world in the form of humanitarian crises,

natural resource competition, armed conflict and even state failure.[3] Inaction now will only increase the threats the United States must face later and reduce its ability to manage those threats. Acting now to substantially reduce domestic emissions is essential given America's strategic global role, its contributions to the climate problem and the increasing risk of catastrophic climate impacts. But domestic action alone will not suffice—half of global emissions come from developing nations and those countries are expected to account for nearly all

of the expected 45 percent growth in global emissions by 2030. Reducing emissions in developing nations will require new forms of international cooperation, because many developing countries lack the means and the financial and political incentives to act.

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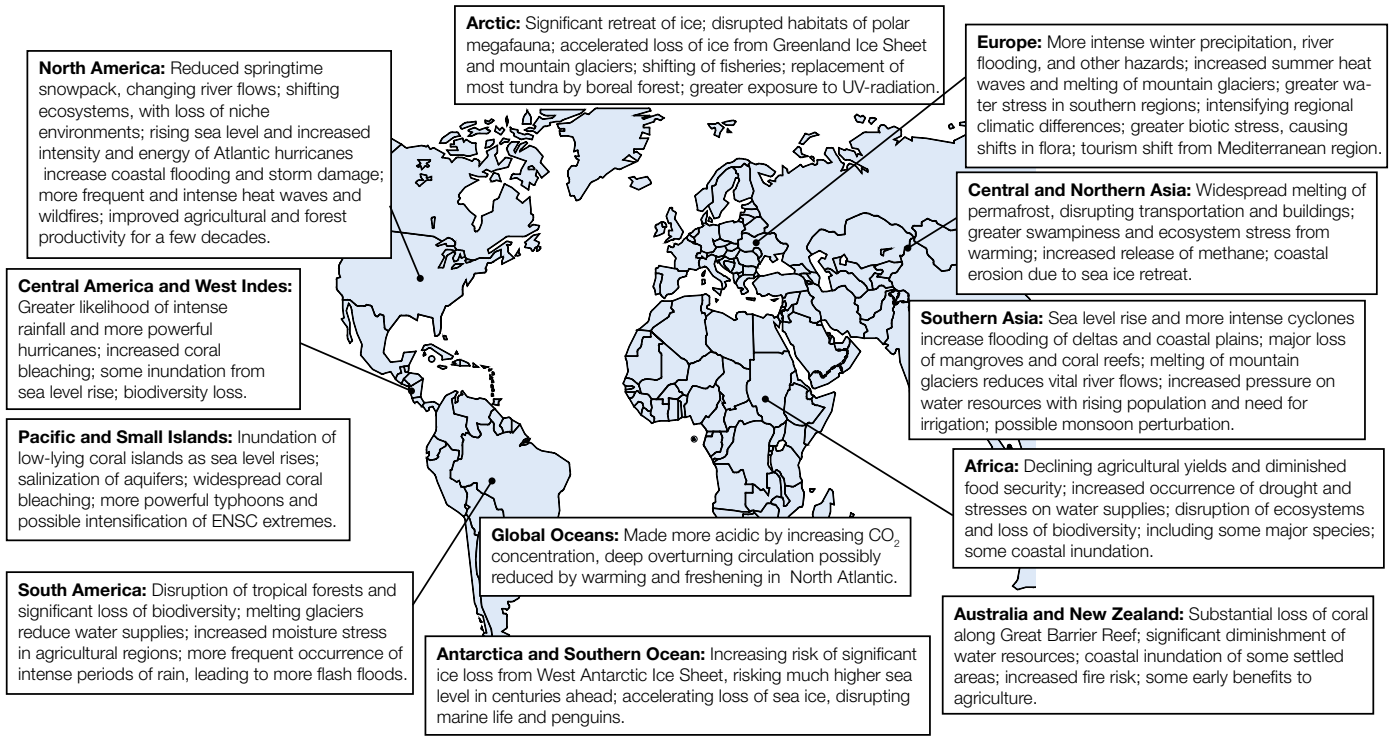
Commissioner Perspective:

CHUCK HAGEL

Former United States Senator, Nebraska

"Although the bulk of our planet's tropical forests are found on foreign shores, the effects of deforestation transcend national borders, increasing the pace and severity of global warming worldwide. Tropical deforestation is a major element of the climate threat and requires our immediate attention, as any other global crisis would. It is clearly in our national interest – economic, foreign policy, national security and beyond – to confront this threat. As the world's largest economy and most powerful nation, we must work closely with our allies in both the developed and developing worlds to cut tropical deforestation in half within a decade. We have helped the world face potentially catastrophic threats before. We must heed the call to do so again."

Figure 1: Impacts of Climate Change Around the World



Source: Adapted from Scientific Expert Group on Climate Change (SEG) (2007) *Confronting Climate Change: Avoiding the Unmanageable and Managing the Unavoidable* [Rosina M. Bierbaum, John P. Holdren, Michael C. MacCracken, Richard H. Moss, and Peter H. Raven (eds.)]. Report prepared for the United Nations Commission on Sustainable Development, Research Triangle Park, NC, Sigma Xi, and Washington, DC, the United Nations Foundation.

Finding: Climate change is a major and growing threat to the United States and the world.

Recommendation: The United States should adopt strong domestic climate change laws that reduce U.S. emissions 80 percent by 2050 and contain interim goals consistent with climate science, thereby helping to galvanize ambitious international action. In July 2009, during the Group of Eight (G8) and Major Economies Forum (MEF) meetings, world leaders endorsed the consensus scientific view that global average temperature increases ought not to exceed 3.6° Fahrenheit (2 degrees Celsius) above pre-industrial levels in order to avoid unacceptable climate risks.[5]

Finding: The consensus scientific view is that global average temperature increases ought not to exceed 3.6 degrees Fahrenheit (2 degrees Celsius) above pre-industrial levels in order to avoid unacceptable climate risks.

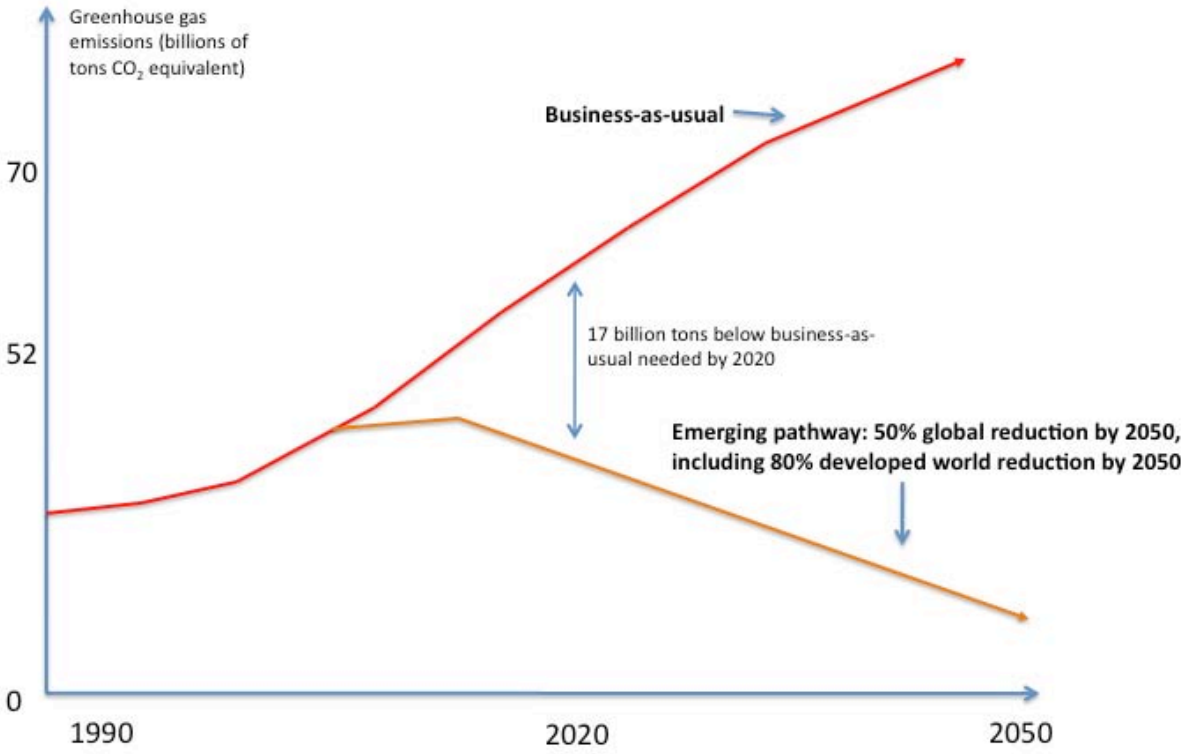
Achieving this goal will require reducing global emissions by 50 percent by 2050, with industrialized nations reducing emissions 80 percent or more, and developing nations taking increasingly ambitious actions in the same time frame. Leaders of all G8 industrialized nations also endorsed these emission reductions objectives at their July 2009 summit. While developing nations have yet to embrace these 2050 emission reduction goals, many key nations appear willing to do so provided that developed nations play a major role in financing global action. The climate bill passed on June 26, 2009, by the U.S. House of Representatives (titled the American Clean Energy and Security Act) is broadly consistent with this emerging global policy framework as it would require the United States to reduce emissions 80 percent by 2050 and would make developing nations eligible for tens of billions of dollars in financial support for ambitious climate action.

Finding: Achieving these goals will require reducing global emissions by 50 percent by 2050, with industrialized nations reducing emissions 80 percent or more, and developing nations taking increasingly ambitious actions in the same time frame.

Achieving ambitious emissions reduction goals for 2050 will be impossible without nations setting and meeting interim benchmarks along the way. According to the Nobel Prize-winning Intergovernmental Panel on Climate Change, global emissions may need to peak within a decade, with emissions in developed nations declining 25-40 percent from 1990 levels by 2020 and emissions in developing nations making a significant deviation from business-as-usual projections. Making these mid-term goals a reality constitutes a major challenge for the United States and the world. It would require averting at least 17 billion tons per year of expected carbon dioxide emissions by 2020 under business-as-usual projections (see Figure 2).[6]

Finding: Given the seriousness of these climate risks to U.S. national interests, it is imperative that the United States marshals an effective and timely global response.

Figure 2: Emerging Global Climate Objectives



Source: Climate Advisers analysis, adapted from Project Catalyst (2009) *Limiting atmospheric CO2e to 450 ppm – the mitigation challenge,* San Francisco, CA, ClimateWorks Foundation.

Although developed countries are largely responsible for anthropogenic climate change, most cost-effective emission reductions opportunities are in the developing world. However, many developing nations have few resources and inadequate technical know-how for implementing climate solutions. Developing nations are also quick to highlight the inequity of expecting them to finance emissions mitigation simply because they have low-cost opportunities for action. From the standpoint of international equity, world leaders have agreed that although all countries should bear some responsibility, developed nations should do more not less than developing nations.

Finding: In order to reach these global goals in a cost-effective manner, developed nations will need to help finance substantial emission reductions in developing countries.

Solving the climate problem will not be easy. Indeed, the only path to stabilization that avoids the high risk of dangerous impacts, and that is both economically efficient and equitable, is for developed nations to partner with developing nations and jointly invest in the most cost-effective climate solutions.

Developed nations, including the United States, will need to provide substantial new funding to help finance international action.

Principle: U.S. policies to reduce tropical deforestation must promote international partnerships.

Success Depends on Tropical Forests

As part of a comprehensive effort, focusing new international climate cooperation on reducing tropical deforestation will be absolutely essential. Tropical deforestation currently accounts for 5.5-6 billion tons of greenhouse gas emissions each year, nearly all in developing nations (see Figure 3).[7] In fact, together with other land-use changes forests account for 17 percent of global greenhouse gas emissions, more than all the automobiles, airplanes, trains and ships in the world.[8]

Finding: Deforestation accounts for 17 percent of global emissions, more than the entire global transportation sector, and can be addressed cost-effectively now.

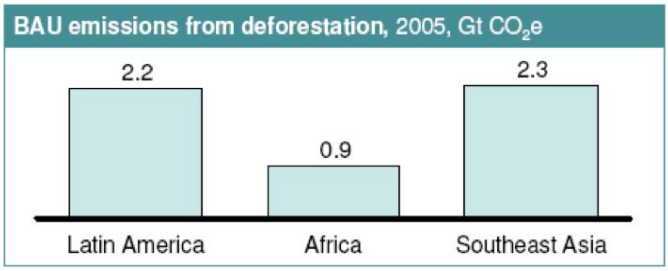
(Recent studies have questioned this widely cited figure, suggesting it may be too high.[9] However, a scientific consensus has yet to emerge around a new number. Therefore, throughout this paper 17 percent is used since it is the current scientific consensus as reflected in the 2007 Intergovernmental Panel on Climate Change report.) Of the 11-12 billion tons of emission reductions in developing nations that would need to be found by 2020 to reduce global emissions cost-effectively on a path toward a 50 percent reduction by 2050, about 40 percent could come from reducing tropical deforestation (3.5-4.0 billion tons) or planting new forests (0.5-1 billion tons).[10]

Thus, halving emissions from deforestation by 2020 is both achievable and necessary to help meet global emission reduction goals. An effective effort, however, must also engage countries with large standing forests but currently low rates of deforestation where forests may be threatened in the future under a business-as-usual scenario as global competition for land increases.

These forests represent one of the greatest potential new sources in emissions in the developing world absent immediate action. In short, without conserving tropical forests it will be virtually impossible for the world to avoid unacceptable risks of dangerous climate change.

Finding: Meeting long-term emissions goals cost-effectively will be almost impossible absent a dramatic reduction in tropical deforestation before 2020.

Figure 3: Geography of Emissions from Tropical Deforestation



Source: Project Catalyst (2009)
Towards the inclusion of forest-based mitigation in a global climate agreement,
San Francisco, CA, ClimateWorks Foundation.

Making tropical forest conservation a central element of a comprehensive U.S. climate program is the key to reducing emissions quickly and affordably. According to U.S. government estimates of the cap-and-trade bill approved by the House in June 2009, the overall cost of compliance with the bill would rise approximately $500 billion if U.S. companies were not allowed to receive credit for financing international emissions reductions.[11] According to EPA cost curves, emission reductions from tropical forests could account for about 60 percent of the international reductions that could be financed in lieu of more costly domestic action, indicating that they would make up a substantial portion of emission reductions financed internationally by U.S. companies under a cap-and-trade program.[12] Other estimates suggest that tropical forests could account for over 80 percent of the lowest cost emission reductions in developing nations prior to 2020.[13]

Compared to other climate protection strategies, forest conservation also has the advantage of not requiring major new technologies to begin producing results (although it will require new governance, monitoring and verification and finance models). Along with other immediate emissions mitigation opportunities like efficiency gains, it can therefore help smooth the transition to a low-carbon economy,[14] buying time for the commercialization and dissemination of more advanced clean energy solutions.

Commissioner Perspective:

FRANK LOY

Former Under Secretary of State for Global Affairs

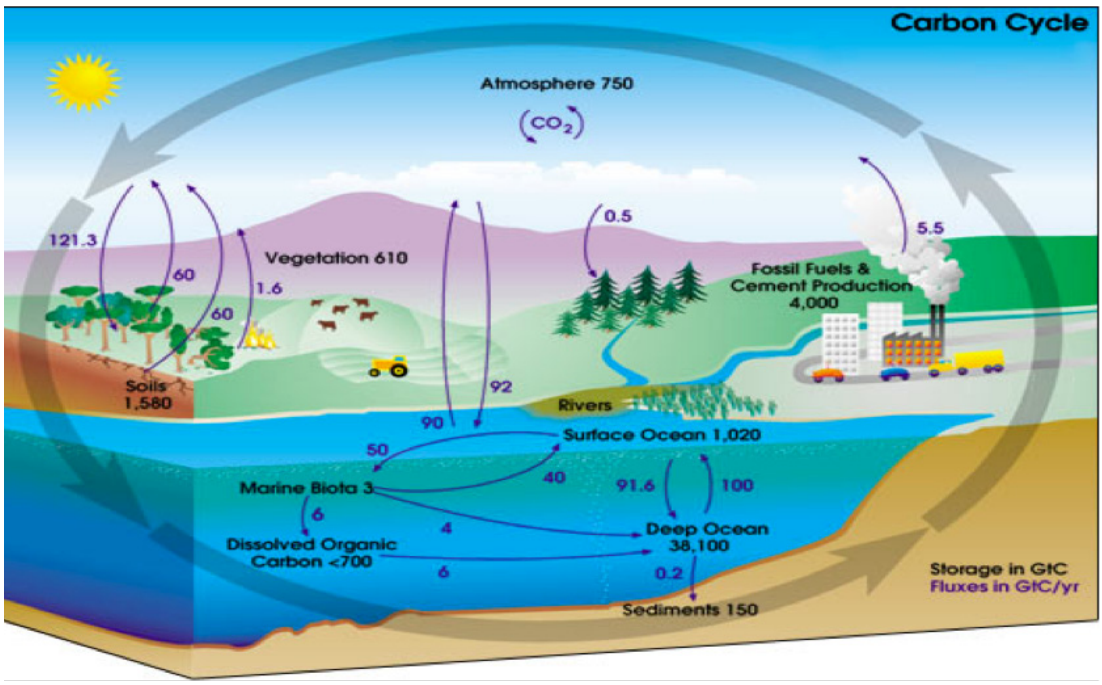
"What the science tells us today is brutal and unprecedented—though not without hope: Our knowledge and technology has given our species the power — by changing the planet's climate — to worsen dramatically our way of life, and maybe threaten its very existence. That sounds like scaremongering, but the evidence is overwhelming. Solutions are hard to come by, largely because what needs to be done appears expensive (and hits established interests), and because industrialized and developing countries see the problem differently. Reducing tropical deforestation addresses exactly these barriers. It puts developing and industrialized countries more on the same side, and dramatically lowers the cost of what we must do."

Finding: The United States has much to gain by focusing on tropical deforestation as part of a balanced suite of policies that would also substantially reduce U.S. domestic emissions.

Box 1
The Carbon Cycle

Forests play a complex and poorly understood role in regulating the Earth's climate and mitigating the impacts of climate change (see Figure 4). Forests naturally absorb and release carbon dioxide from their biomass and soils. This annual natural flux (in purple) is much larger than changes in industrial emissions. Changes in forest cover and quality, moreover, can increase or decrease carbon storage. Thus, unlike fossil fuels, tropical forests and soils can serve as "sinks" by removing carbon from the atmosphere. Carbon stored by forests and soils (in black) is also greater than carbon stored by the atmosphere.

Figure 4: The Role of Forests in the Carbon Cycle



Source: National Aeronautics and Space Administration (NASA) Earth Science Enterprise
http://earthobservatory.nasa.gov/Features/CarbonCycle/carbon_cycle4.php

Well-managed tropical forests also reduce the vulnerability of developing nations to climate change, by helping to mitigate the impacts of extreme storms, floods, and drought. However, climate change also threatens the existence of tropical forests since these ecosystems are sensitive to changes in precipitation and temperature. Some scientists have projected that even with optimistic assumptions about climate impacts over the next century the Amazon region could lose 20-40 percent or more of remaining forest cover solely as a result of climate change, which could have important economic, social and climate policy implications. This creates the possibility of a positive feedback loop between climate change and deforestation.

The Current State of the World's Tropical Forests

Tropical deforestation rates increased 10 percent from the 1980s to the 1990s, and with few exceptions, most notably in Brazil, they show no signs of slowing in the current decade. About 13 million hectares of forest—an area about the size of New York State—were lost each year from 2000 to 2005.[15] Importantly, nearly all global emissions from deforestation are from developing countries in the tropics.[16] Deforestation is also highly concentrated geographically, with about 50 percent of emissions occurring in only two countries—Brazil and Indonesia—and a few dozen other developing countries in the tropics accounting for most of the rest.[17] Forests in many developed and developing nations, including the United States, China and Costa Rica, have actually increased in density and area over the past several decades.[18]

Finding: The world's tropical forests are disappearing at an alarming rate.

The direct causes of tropical deforestation vary by region—mainly ranching, agriculture, and logging—but are closely related to land tenure issues associated with all three and, important for all countries to address, global demand for food and forest products (see Figure 5).[19] Ranching and subsistence agriculture are the largest drivers in Latin America, while intensive and subsistence agriculture account for the bulk of emissions in Africa and Southeast Asia.

Brazil has reduced deforestation dramatically since 2004, but it remains unclear how permanent those gains really are in the context of rising commodity prices and its history of fluctuations in deforestation rates.[20] Costa Rica and China have largely stabilized deforestation with strong government backing and payments to local landowners for forest conservation and reforestation activities.[21] However, China's increasing demand for forest products has accelerated deforestation elsewhere in Southeast Asia and in other nations that lack environmental standards.[22] Some countries, such as India, have also made major strides, but in other nations tropical deforestation is still proceeding at an alarming

rate, creating the need for urgent action. Many poor nations in the Congo basin and parts of South America with large intact forests and historically low rates of forest loss could begin rapid deforestation soon. These high-forest, low-deforestation nations account for almost 20 percent of global forest carbon stocks.[23]

Envisioning Solutions: A Forest Carbon Bridge

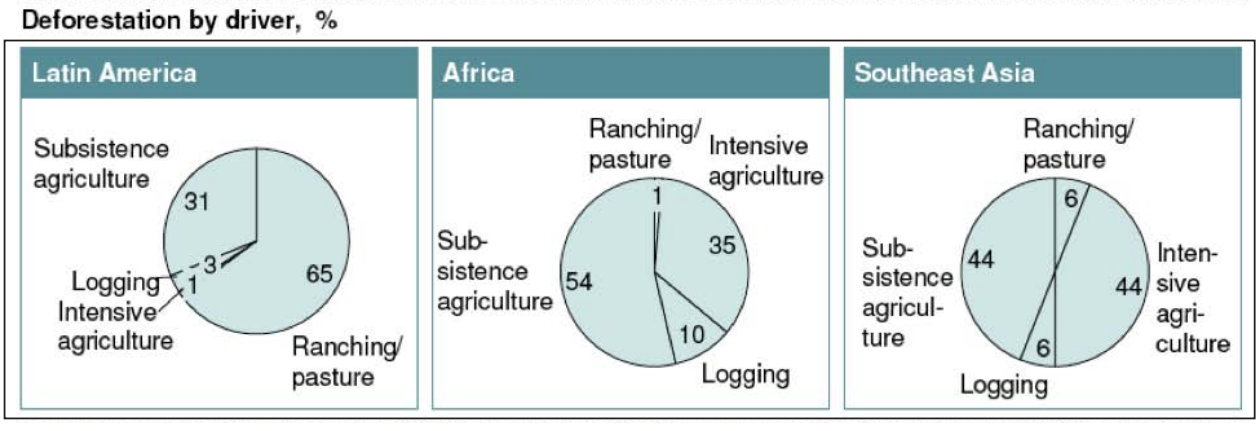
As forested nations undergo economic development, they tend to follow a traditional "forest transition" pathway that begins with an initial period of rapid deforestation and economic activity, followed by the stabilization and eventual re-growth of forests (see Figure 6).

Since the root cause of deforestation is, in most cases, the tangible economic benefit it generates in the form of timber revenue and/or income from farming and ranching, a key to success will be fundamentally realigning the economic incentives of developing nations and local stakeholders. Solutions will also need to be closely tailored to local drivers of deforestation, and political, social, economic and biological conditions. Policies will

Commissioner Perspective:
LYNN SCARLETT
Former Deputy Secretary of the Interior

"Conserving tropical forests sustains wildlife, protects water supplies, and helps moderate carbon dioxide levels globally. Seeing firsthand the effects of deforestation is humbling. Knowing those effects have worldwide environmental, economic, and social implications underscores the imperative of reversing the course of deforestation. Many local communities, through conservation partnerships, are conserving tropical forests, but only U.S. policy leadership can galvanize global action with the speed, scope, and scale necessary to prevent catastrophic forest losses. Cooperation among government officials in the U.S. and around the globe, working with those who rely on tropical forests for their livelihood, will be essential to sustain conservation. The recommendations we have delineated can help policy makers address deforestation challenges in the context of a changing climate."

Figure 5: Drivers of Deforestation by Region



Source: Project Catalyst (2009) *Towards the inclusion of forest-based mitigation in a global climate agreement,* San Francisco, CA, ClimateWorks Foundation.

need to both help countries with currently high rates of deforestation to promote economic growth while reducing their deforestation rates and help countries with large forest stocks but low deforestation rates to "cross the gap" of the typical forest transition pathway from poverty to prosperity without passing through the intermediate stage of rapid deforestation that comes with traditional "carbon-intensive" economic development.[24]

This idea that economic incentives can help developing nations move from underdevelopment to prosperity in ways that avoid deforestation constitutes a "forest carbon bridge," similar to the "leapfrogging" many developing nations have done in communications or information technology. In the forest sector, new financial incentives must be accompanied by fundamental reforms including land-use and land-tenure policies, forest governance, and infrastructure and agriculture policies. These reforms are needed to increase the effectiveness of government institutions, strengthen policy frameworks, fight corruption, and build local ownership of new forest conservation policies to ensure their implementation and sustainability.

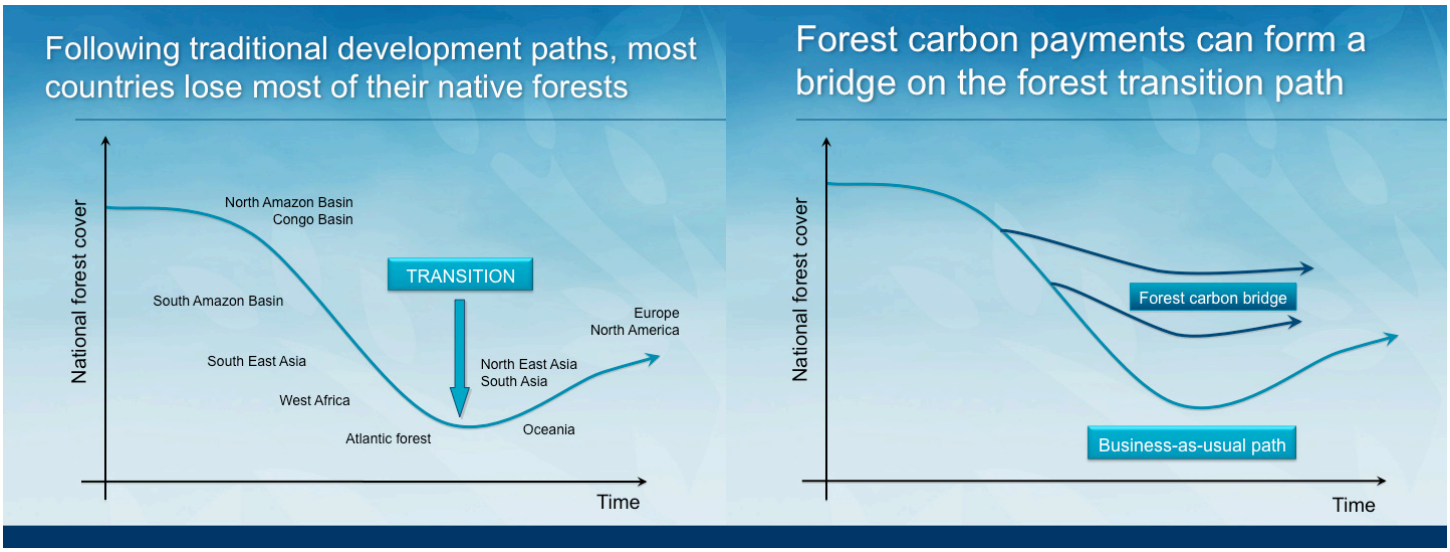
The need for external financing of the forest carbon bridge will dissipate over time as circumstances change in developing nations and that financing helps to promote sustainable, "low-carbon" economic growth and development. Deforestation pressures tend to decrease as populations urbanize, move into service and manufacturing sectors, intensify agricultural production, and improve natural resource management practices. Many developing nations can aim to cross the gap within a few decades, with the technical and financial support outlined in this report. For example, the goal of Brazil's 2008 national forest conservation strategy is to reduce deforestation 80 percent by 2020, and progress so far is encouraging.[25]

Best Activities and Places for Forest Conservation

Finding: Economic incentives are needed to provide a "bridge" to lasting forest conservation in developing nations.

Dividing forest-related emissions by source and cause helps identify the most realistic, beneficial and cost-effective solutions. By far the largest opportunity lies in reducing rates of deforestation (once called "avoided

Figure 6: Crossing the Gap



Source: *Adapted from unpublished slides prepared by Loisel, C. and Zarin, D.*

deforestation" and now more commonly referred to as "reduced emissions from deforestation and degradation" or the acronym REDD [26]). Other essential strategies for success include: reducing degradation associated with selective logging and other extractive activities; reforestation (planting new forests and revitalizing degraded forests); afforestation (planting new forests on lands that have not been forests for centuries or have never been forest); conserving carbon-rich peatlands (wetlands rich in carbon and other greenhouse gases) that can be cleared for biofuels or other uses; and improving forest management through more sustainable timber harvesting and other agro-forestry practices.[27] Degradation refers to the reduction of biomass in forests without resulting in full land conversion and can be an important precursor for deforestation, making the avoidance of degradation a critical component of any policy response. Reforestation and afforestation take longer to produce major gains, because trees require several decades to grow large enough to store substantial amounts of carbon. However, they reduce pressure on standing forests by creating a new, sustainable source of timber products.

Different activities will be more prevalent and productive in different locations, depending on forest types, historical patterns and current drivers of deforestation. Harnessing reductions from each activity will also require diverse policy frameworks and financial mechanisms. Whereas afforestation and reforestation are already permitted under international market approaches such as the Clean Development Mechanism, no established system exists for reducing emissions from deforestation, which may involve the more challenging process of setting baseline deforestation rates against which to measure progress, and measuring existing and future forest carbon stocks. Focusing on reducing deforestation, however, makes sense because emission reductions are affordable and provide many co-benefits (security, development and biodiversity). Emissions from extremely greenhouse gas-rich peatlands are particularly important in some locations, such as Indonesia, but peatlands-monitoring and measurement is even more challenging than for other activities. As soon as technical impediments can be overcome, however, peatlands lands are likely to provide an attractive focus for U.S. leadership because emission reduction opportunities are expected to be low-cost and plentiful.

Finding: The most cost-effective opportunities to reduce emissions from tropical deforestation are concentrated by activity and geography.

The overall objectives laid out in this paper of reducing emissions from deforestation by 50 percent by 2020 and achieving net zero emissions by 2030 are intended to encompass all of these activities, with the acknowledgment that reductions in deforestation should be prioritized initially, and that accurately accounting for reductions from peatlands lands may require some time. A future ideal system would also include mechanisms for restoring productivity to degraded lands and improving agricultural practices—in other words promoting low-carbon practices throughout the land-use sector.[28]

In the near term, these emission reductions are most likely to be achieved in a few targeted areas of the world, including much of tropical South America and parts of Southeast Asia and Central America. In the future, Congo Basin countries hold great promise if local governance can be strengthened.[29]

Recommendation: With other nations, the United States should lead a global partnership to cut tropical deforestation in half within a decade and achieve zero net emissions from the forest sector by no later than 2030. Given the urgency and importance of tropical forest conservation to climate protection, the world must act decisively and ambitiously. The United States must play a leadership role in creating a strong global partnership with developing nations to reduce emissions from tropical deforestation by 50 percent within a decade and achieve zero net deforestation by 2030. This would amount to reducing emissions caused by tropical deforestation by 2.75-3 billion tons per year by 2020 and the full current 5.5-6 billion tons per year by 2030. Achieving this goal will not be easy, but it is feasible. With political will and ambitious actions by developing nations, supported by financial and technical assistance from developed nations, emission reductions from reducing deforestation can form a major component of the cost-effective, near-term reductions needed to achieve climate stabilization.

A review of economic models and country studies reveals two different scenarios for reaching this target: one where governance reforms unlock substantial mitigation potential in key geographic areas (especially Indonesia and the Congo Basin), and one where poor governance capacity continues to limit these opportunities. In either scenario, maximizing reductions in Brazil will be critical, as it is more prepared than perhaps any other nation to deliver large amounts of verified reductions. In order to meet the goal of reducing emissions from deforestation 50 percent by 2020, Brazil alone will likely need to reduce its emissions from deforestation by at least 1 billion tons, which is consistent with their national objectives. In a scenario where governance reforms are able to fully unlock mitigation potential in Indonesia and the Congo Basin, economic models indicate that combined these areas could deliver at least 1.1 billion tons of reductions by 2020.[30] This amount could substantially increase if opportunities in peatlands lands are captured or reductions are compared against business-as-usual projections instead of current levels. With modest reductions from other countries, including middle-income countries such as Malaysia and Mexico, the 50 percent target could be reached.

If governance reforms are not fully successful in Indonesia or the Congo Basin, it is likely that substantially fewer tons of verified reductions could be achieved from these areas. In this scenario, the world can only get close to its 2.75-3 billion ton goal by unlocking additional mitigation potential in non-Amazon regions of Brazil, including its Atlantic forests, and capturing nearly every available opportunity in other small- and medium-size nations. Therefore, the most promising U.S. strategy should include three concrete components: a major bilateral partnership with Brazil centered on results-based financial incentives for achieving national emission reductions from the forest sector; major bilateral partnerships with Indonesia and Congo Basin nations to build capacity, promote governance reforms and incentivize forest emission reductions; and a broad multilateral initiative with participation from small- and medium-sized tropical forest nations.

These partnerships could be prioritized on a variety of criteria, including emissions reduction potential, national readiness and associated "co-benefits" (national security, development and biodiversity). With success on these three fronts, it is feasible for the world to reach its objective of halving emissions from tropical deforestation within a decade. Achieving zero net emissions from deforestation by 2030 will obviously require scaling-up efforts and capturing all of these opportunities, while preventing increases elsewhere.

While these estimates are supported by economic analysis and national reviews, solutions will vary from place to place. The next section of this paper describes the challenges, strategies and implications of reducing emissions substantially in three specific locations — Brazil, Indonesia and the Congo Basin, the three largest tropical forest regions in the world. The focus on these large opportunities is not intended to downplay the potential of United States partnerships with smaller countries; indeed many nations such as Guyana have been and will continue to play leading roles in pioneering innovative policies and approaches that inform broader international efforts to reduce emissions from deforestation. The following case studies were chosen to illustrate in concrete terms the enormous

scale of efforts required and potential challenges that will be faced in some specific areas.

Finding: A successful alliance will need to achieve substantial reductions in key countries and regions.

Case Studies

Brazil

No country is more important for the global effort to reduce emissions from tropical deforestation than Brazil, and there is also no country more engaged in finding solutions. Deforestation in Brazil has largely been driven by the conversion of forests to cattle pasture, but illegal logging and the expansion of agricultural products such as soy have also been important factors. Recent news reports about local soy production in the state of Mato Grosso highlighted the dilemma faced by many Brazilian farmers.[31] Although some farmers and ranchers have a strong desire to do what is right for the environment, the financial benefits from clearing land for soy can be nearly 100 times the payments they have been offered to keep forests standing on their land. Most farmers in the Amazon region are already required by national and local conservation laws to keep 50-80 percent of their land forested. In the past, these laws have been enforced sporadically, but efforts to crack down on illegal forest conversion have increased in recent years, resulting in dozens of convictions and imprisonments. Nonetheless, securing long-lasting gains against deforestation will be nearly impossible without changing underlying financial incentives faced by ranchers and farmers.

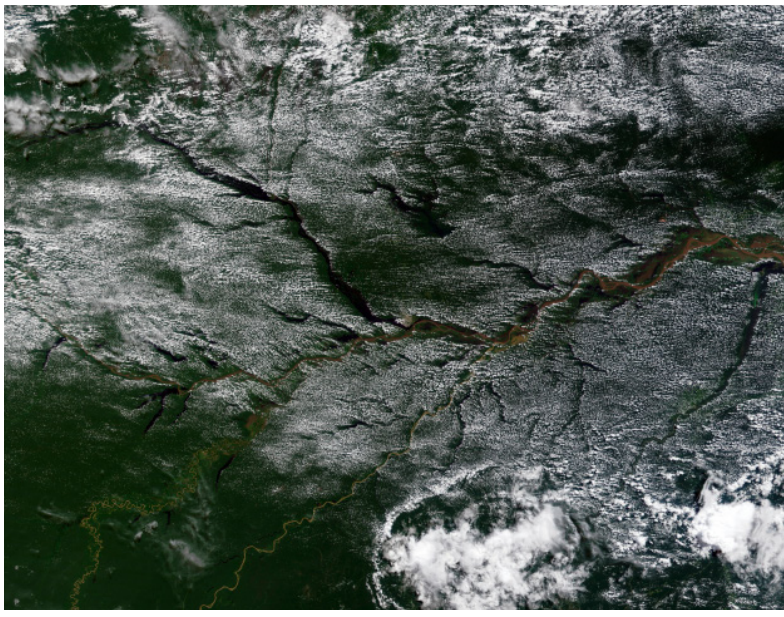
Emissions from deforestation alone in Brazil account for 2.5-5.0 percent of total global greenhouse gas emissions, making it the fourth-largest emitter in the world.[32] Over the past 30 years about 15 percent of the 1.2 billion acre Amazon region has been deforested, with rates fluctuating between about 2.5 million acres and 7 million acres per year, driven by long-term economic cycles and periodic policy interventions.[33] In 2004, one of the worst years on record, over 6.7 million acres of deforestation in the Brazilian Amazon accounted for about 1.8 billion tons of carbon dioxide emissions — over 50 percent of total national emissions.[34] While the deforestation rate fell to 3.0 million acres in 2007 with relatively low commodity prices, it increased with rising commodity prices in 2008, indicating that much work remains to be done (see Figure 7).

Commissioner Perspective:

THOMAS PICKERING

Former U.S. Ambassador to the United Nations

"If the U.S. is to lead the global effort to combat climate change, it must lead by example. At stake is our position as a global leader and our ability to achieve other major foreign policy objectives. Tropical forests offer a chance for developed nations, led by the U.S., to work hand-in-hand with developing nations to address climate change. It would be deeply short-sighted to let the politics of the moment blind us either to the significance of forests' role or to the necessity of taking action now. The U.S. is the nation best suited to answer that call – and we must, not only to prevent catastrophe, but to restore our position as the leading global diplomat."



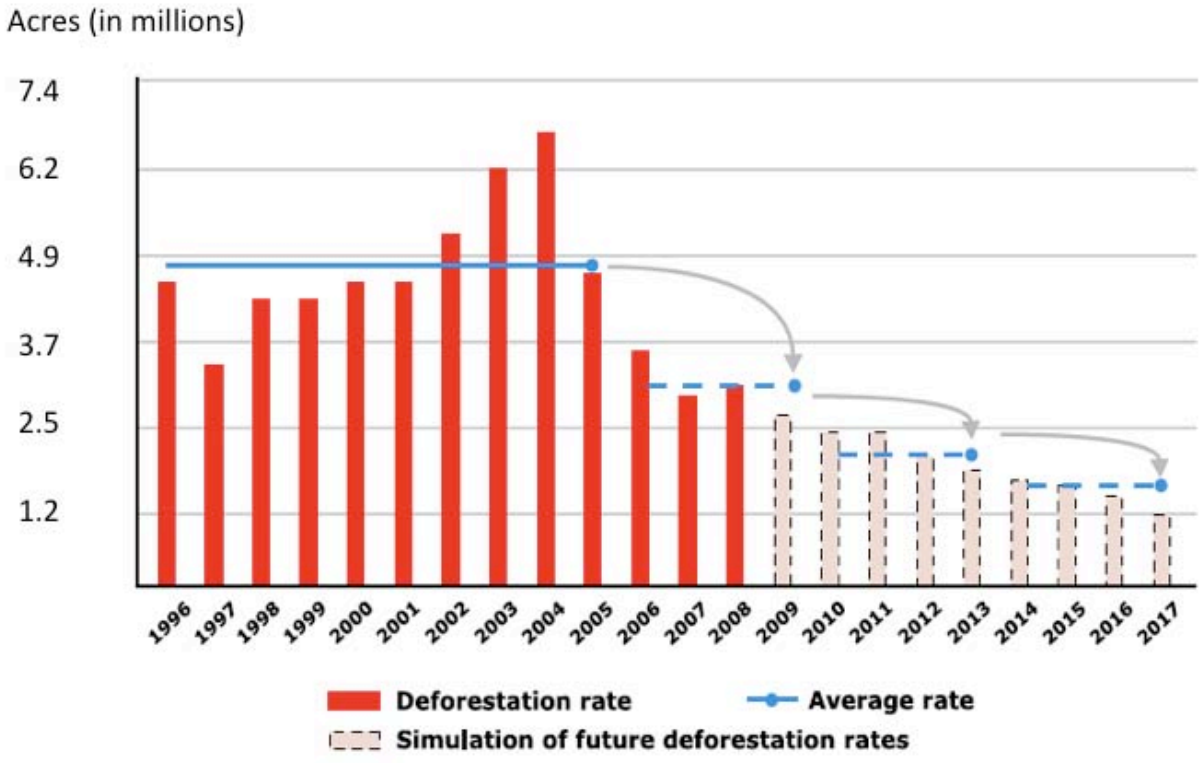
Brazil recently set an ambitious target of reducing its deforestation rate in the Amazon region 80 percent below its 1996-2005 historical average by 2020. If this Amazon region objective were achieved, emissions from deforestation in Brazil would be reduced by about 1.0 billion tons per year (depending on estimates of the carbon content of forests), greater than total emissions from Canada.

One recent analysis indicates that by further reducing this rate, by lowering deforestation rates in other areas of Brazil, and through reforestation initiatives, Brazil could achieve a total reduction of 1.36 billion tons below business-as-usual emissions in 2030.[35] Therefore, Brazil alone could yield almost one-half of necessary global reductions to halve deforestation by 2020, with further reductions to 2030.

Unlike many other developing nations, Brazil is well positioned to be able to measure, monitor and verify emission reductions in its forest sector. The country has invested heavily in earth observation satellites and remote sensing technologies. While further improvements will be necessary, Brazil's forest and carbon data is at least as credible and current as that of many developed nations.

In 2008, Brazil announced the creation of an "Amazon Fund" intended to raise $21 billion over 13 years from the international community to support Brazil's efforts to halt deforestation in the Amazon region.[36] Thus, the fund represents the first truly large pay-for-performance approach where financial contributions translate into verifiable emission reductions, with donations structured as an "ex-post" payment at a rate of $5 per ton of emissions reduced.[37]

Figure 7: Brazil's Historic Deforestation Rate and Future Objectives



Source: Adapted from Government of Brazil (2007) *National Plan on Climate Change, Executive Summary,* Brazil.

Norway is the only nation that has already committed significant funding to the Amazon Fund, although a number of other developed nations are considering contributions. Norway has provided $110 million to the fund based on emission reductions Brazil has achieved in the Amazon since 2006. In addition, Norway has pledged to contribute up to $1 billion through 2020 provided Brazil continues to reduce its emissions in the Amazon.[38]

Brazil's commitment to reduce deforestation in the Amazon has been translated into official policy and is backed by deep and broadly felt popular concern in Brazil about both deforestation and climate change. However, the effectiveness of Brazil's initiatives will be tested in the coming years. One question now is whether other developed nations will come forward with contributions to the Amazon Fund. Another question is whether Brazil will be able to sustain progress in reducing deforestation when commodity prices increase for soy, beef and other agricultural products.

Importantly, Brazil's national government has thus far opposed selling emission reductions from the Amazon region into international private sector carbon markets. This presents a challenge for the United States, where regulated companies may want to purchase verified emission reductions from Brazil to help control the cost of new U.S. climate policies.

The Brazilian Federal government's opposition to participating in developed country carbon offset markets has also created tensions internally with Brazil's Amazon region states that see global carbon markets as a new source of revenue. States are interested in discussing market possibilities and are pushing the federal Government towards considering such options.

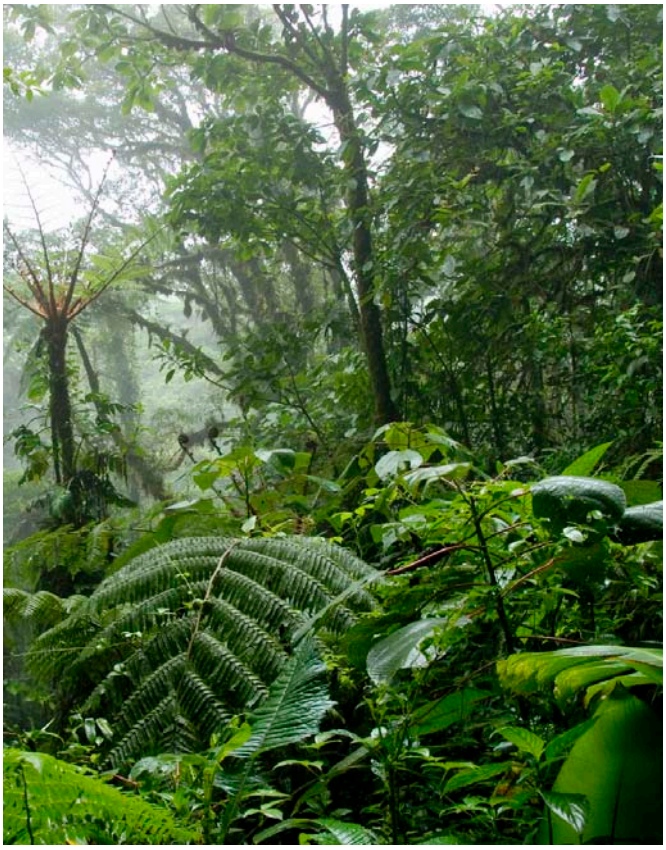
States have also been engaged in initiatives that involve U.S. state-level carbon markets, such as in California. The Obama Administration recently initiated bilateral climate change consultations with Brazil, which could result in a new framework for U.S. support for reducing deforestation in the Amazon.

Indonesia

Reducing emissions from deforestation in Indonesia is also essential to meeting the goal of lowering global emissions from deforestation by 50 percent by 2020 and achieving zero net emissions by 2030. Indonesia is the world's third largest greenhouse gas emitter, largely because of emissions from deforestation and destruction of peatlands lands. Deforestation in Indonesia is occurring almost as rapidly as in Brazil, with 4.9 million acres lost in 2005, accounting for about 850 million tons of carbon dioxide emissions. Combined with emissions from peatlands lands, total emissions can stretch over 2 billion tons per year[39] or about 6 percent of total global emissions from all sectors. Deforestation in Indonesia is driven by global demand for food and forest products, especially hardwood, paper, and, increasingly, biofuels such as palm oil. Like cattle and soy in Brazil, palm oil production in Indonesia has recently been at the frontier of the tradeoff between economic growth and the protection of forests. The palm oil industry's

Commissioner Perspective:
MARK TERCEK
CEO, The Nature Conservancy

"Tropical forests serve as the lungs of the Earth. They manage the world's carbon dioxide levels, are home to the world's most diverse species and provide essential services — such as food, water and shelter — to millions of people across the globe. But these vital ecosystems are disappearing at an alarming rate. The good news is preserving these forests requires no new technologies — just a truly collaborative effort that provides incentives to protect forests long-term. Successful on-the-ground projects prove we can achieve carbon emission reductions while working with local stakeholders to incentivize forest preservation. Without U.S. leadership, however, taking these efforts to a global scale will be extraordinarily difficult. There is a strong foundation of success to build on, and we need to start now."



growth has been driven by demand for biofuels from the developed world and China. Conversion of native forests to fiber plantations has also been exacerbated by an overcapacity of mill facilities that far exceeds sustainable rates of production.

According to economic models, forest conservation efforts in Indonesia could be highly cost-effective and large-scale. Indonesian forests could actually have negative net emissions by 2030 at relatively low costs per ton (i.e. reforestation would absorb more carbon than is emitted by deforestation). This could account for a reduction of 1.1 billion tons of forest emissions by 2030, and peatlands lands could deliver an additional 0.7 billion tons of abatement by 2030. According to one study, in both cases, most of these reductions would cost less than $8 per ton, which is less than half the expected price of carbon under the House climate bill and significantly less than the cost of carbon today in Europe. [40] An investment of roughly $10 billion per year by 2020 therefore has the potential to yield about 1 billion tons of emission reductions per year from Indonesia's forests.

Actual reductions are unlikely to come close to reaching 1 billion tons without large-scale reforms in Indonesia that address the substantial governance, enforcement and illegal logging challenges. According to one economic model where governance factors are included, verified reductions from deforestation in Indonesia would only reach about 300 million tons per year by 2020.[41] Some believe even that total would be a major achievement. Given the importance of achieving reductions in Indonesia to reaching global goals, it will be critical for the United States to mobilize assistance to support and incentivize Indonesia's efforts to reform forest sector policies and governance.

Commissioner Perspective:

D. JAMES BAKER

Director, Global Carbon Measurement Program,
The William J. Clinton Foundation

"America and the world cannot win the fight against rapidly accelerating climate change unless we are prepared to confront all major sources of greenhouse gas emissions. Reducing deforestation and creating new forests are the quickest and most cost-effective ways to reduce carbon dioxide emissions. Together with the emissions from transportation and industry, deforestation represents 30 percent of the total reductions we must make. But it must be done the right way. Proper monitoring, reporting and verification are essential to the success of any program we create. We have a choice — to act now and launch an effective global system, or to watch our broader efforts on climate fail. I think the choice is clear."

One of the greatest challenges for the national and local governments in Indonesia is continuing to crack down on corruption and illegal logging. According to recent reports some improvements have been made, but many experts believe the problem is still rampant. [42] In 2004 Indonesia's environment minister announced that he believed 75 percent of timber in Indonesia was logged illegally. Addressing these issues will not be easy, given the amount of money involved

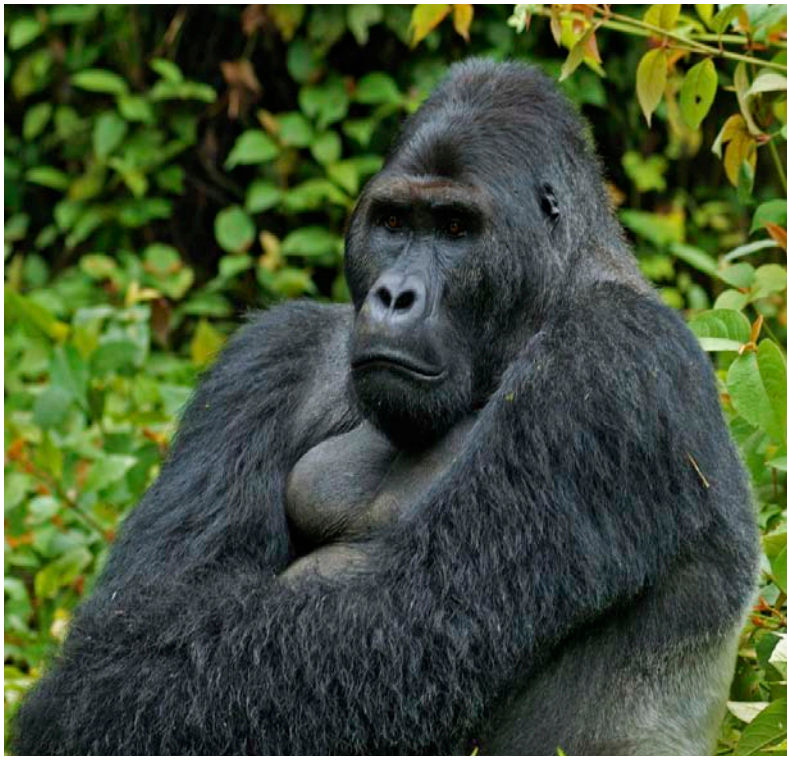
and close historic ties between logging and paper companies and government officials. Indonesia exports about $5 billion in tropical timber annually, but loses about $1 billion a year in tax revenue from illegal timber, much of it thought to be smuggled through nearby areas of Malaysia and Singapore. Logging has devastated some of the most remote areas on the islands of Borneo and Sumatra.[43]

The pulp and paper industry has presented particularly serious challenges, since in many areas the capacity of plants has expanded well beyond the supply of legally harvested timber. Instead of slowing growth of the industry, developers pushed for additional expansion of plantation forests, in some cases to the detriment of carbon-rich peatlands lands.[44] Developed nations such as the United States have an important role to play in this effort by enforcing their existing bans against illegally logged timber and timber product imports.

However, many believe that Indonesia's recent efforts to reduce deforestation are signs of renewed commitment and future success. Indeed, the national government in Indonesia appears eager to partner with developed nations to reduce its deforestation rates. Unlike Brazil, and Indonesia is not opposed to including forests in global carbon markets in some form, and asked for $4 billion between now and 2012 to prepare the country to deliver verified emission reductions for these markets. [45] The government recently released its proposed rules for how revenues would be shared between the local and national governments and project developers for forest conservation projects that could generate credits to be sold into U.S. global markets, indicating that it is serious about taking action if financial incentives are on the table.[46] Indonesia has also been working with Australia and other nations to develop a more robust national system to measure and monitor its forests.[47] Equally if not more important has been the establishment of the Timber Legality Verification System / System Verifikasi Legalitas Kayu (SVLK) that will enable the Indonesian government to assess the legality of timber produced and traded by its forest products industry. This is an important and noteworthy step and hints at the type of concrete actions that will be necessary, perhaps supported by external financing, to actually reduce deforestation and forest degradation rates. With these initial steps and the appearance of political support at the highest levels of government, Indonesia appears ready to engage in this issue, but given its history, the success of these efforts is still uncertain.[48]

Congo Basin

Rising global demand for food and forest products, coupled with new efforts to reduce deforestation in countries where rates are currently high, will put additional pressure on nations with large forests and low rates of deforestation. The Congo Basin region of Central Africa is a prime example of an area where deforestation rates could increase dramatically without sound policies and robust supporting incentives. The Congo Basin region is about 445 million acres and accounts for 20 percent of the world's remaining tropical forests.[49] This forested area is roughly three times the size of Texas. Countries in the region include the Democratic Republic of the Congo, the Republic of the Congo, Cameroon, the Central African Republic, and Gabon. Congo Basin forests are under increasing pressure from commercial



and subsistence timber harvesting, mineral extraction, and subsistence agriculture. A number of organizations and funds have already joined together to tackle this challenge, including the U.S.-led Congo Basin Forest Partnership (CBFP) and the U.K.- and Norway-led Congo Basin Forest Fund (CBFF). The CBFP has helped central African nations protect more than 115 million acres of tropical forests.[50] The CBFF has received an initial contribution of about U.S. $200 million, which aims to achieve emission reductions at a cost of about $6 per ton.[51]

Since the mid 1990's, civil strife in the Congo Basin has placed enormous pressure on forested lands. Hundreds of thousands of refugees have moved through these forests, looting national parks and constructing refugee camps on park borders. As conflict has subsided, logging has increased. In 2004, encouraged by the World Bank, the Republic of the Congo announced its plans to intensify commercial logging. Illegal logging is widespread in many areas as underpaid bureaucrats continue to supplement their incomes by opening restricted areas. Subsistence agriculture is also driving deforestation, as poor farmers and villagers rely on forest lands for farmland and fuel wood.[52]

Above and beyond the challenges involved in managing and conserving the forests of the Congo Basin generally, there are three additional hurdles that must be overcome to include the Congo Basin in climate-related forest conservation programs. The first is undertaking the fundamental governance and policy reforms necessary to make forest conservation a national and regional priority. The second is building the capacity of the Congo Basin countries to accurately measure, monitor and verify emission reductions. The third is determining the scale and structure of conservation incentives in a context where deforestation rates are relatively low now but could rise substantially in the future. It will no doubt take time, financial resources, and technical assistance to sufficiently address these challenges. Based solely on current deforestation rates, Congo Basin countries could generate hundreds of millions of tons of annual emission reductions by 2020 from current levels if adequate financial incentives were available, on the order of several billion dollars.[53] Without effective policy reforms and capacity building, that mitigation opportunity will be reduced to a small fraction of its potential.[54] Reaching the level of capacity needed to achieve these reductions will be a major challenge, but one that the world must take on in order to halve emissions from tropical deforestation by 2020 and achieve zero net emissions by 2030.

International forest conservation is clearly one of the most cost-effective emissions mitigation strategies. Importantly, however, international forest conservation would produce many other benefits to the United States and the world, including strengthening international peace and security, promoting sustainable development and poverty alleviation, improving local governance, combating illegal logging, conserving global biodiversity and protecting critical ecosystems on which people and wildlife depend.

Many Other Benefits

Strengthening International Security

In addition to the impacts of climate change itself, direct effects of environmental degradation and conflict over natural resources, including forests, have emerged as leading global threats to U.S. and international security,

Finding: A global effort to reduce tropical deforestation would strengthen international security by addressing a key source of political instability and conflict.

according to the recent National Intelligence Estimate for the year 2025.[55] Deforestation is often associated with corruption and political instability—including in strategically important countries such as Indonesia and the Democratic Republic of Congo.[56] In poor countries, forests or forest resources can provide an immediate opportunity for economic benefits, but in many cases they are poorly governed and not effectively controlled by national authorities. Thus the legal rights to forest resources are unclear. In addition to the societal conflict this can lead to in areas of scarce or degraded natural resources, such as Darfur and Rwanda, it also contributes to significant conflict in areas with abundant resources that can be easily exploited for economic gain. In recent years deforestation and illegal logging have helped finance and sustain armed conflict, for example, in Liberia. Conversely, forest conservation can promote national reconciliation, as the community-based reforestation programs of Nobel Peace Prize-winner Wangari Maathai and her Greenbelt Movement have shown in Kenya. New climate-related forest conservation programs provide an opportunity to undertake governance reforms and address these underlying problems. Without these reforms, new revenues for managing forests for their carbon could perversely increase the potential for conflict in rural areas.[57]

Climate change is a "threat multiplier" — heightening the risks associated with existing security threats. The impacts of climate change on already poor countries increase political instability and the possibility of failed states, potentially drawing the U.S. military into additional interventions abroad. In addition, by increasing the intensity of extreme weather events like Hurricane Katrina and creating large numbers of "climate refugees," impacts could be directly destabilizing even within the United States. According to one recent study led by a panel of retired military officials, climate change"…has the potential to create sustained natural and humanitarian disasters on a scale far beyond those we see today."[58] Senator John Warner (R-VA, retired) echoed many of these concerns in recent testimony before the Senate Foreign Relations Committee on the national security risks posed by climate change. He emphasized that climate change will make existing security challenges worse, and that the U.S. military will increasingly be called on to assist with humanitarian disasters at a substantial cost to U.S. taxpayers and at the expense of military missions in other areas of the world. Congress has already directed the Department of Defense and other U.S. agencies to fully integrate climate change into their strategic planning and security assessments.[59] The recent National Intelligence Estimate for 2025 highlighted the importance and potential interaction between emerging global challenges related to water, agriculture, climate change and energy security.[60] Numerous other scholars and organizations have reaffirmed the threats posed to national security by climate change.

Alleviating Poverty

Well-designed forest conservation programs could also advance U.S. interests in international development and poverty alleviation.[61] New financial incentives for the rural poor to conserve and better manage forests could improve livelihoods, connect local inhabitants to

Commissioner Perspective:

GENERAL GORDON SULLIVAN

Former Chief of Staff, United States Army

"After a lifetime of service in our nation's armed forces, my principal concern is preventing conflict. We know unequivocally that climate change, left unaddressed, will become a threat multiplier in dangerously unstable regions of the world — and tropical deforestation is a threat multiplier for climate change. Deforestation not only accelerates that change, but it causes soil degradation, loss of fresh water and reduced access to natural resources — all of which displace populations and intensify security issues. The U.S. has a compelling security interest in the stability of forest-abundant nations. Ignoring that interest will allow unchecked climate change to drive states into failure and people into conflict. That is an outcome we can and must avoid."

Commissioner Perspective:

SHERRI GOODMAN

Former Deputy Under Secretary of Defense for Environmental Security

"The debate over whether and how to confront climate change continues, but the reality is this: a rapidly changing climate will drive instability in developing and industrialized nations. Our national security leaders have wisely recognized the threat posed by climate change, and the unavoidable next step is to address its causes – of which tropical deforestation is a major one. Many forest-abundant nations are central to U.S. interests, and are located in regions where fragile states, extremists and political unrest are already a serious concern. Swiftly and effectively stopping deforestation and slowing climate change must therefore be a national security priority. We have already seen regions like Darfur plunged into violence in the midst of a changing climate. We have a fundamental responsibility to address deforestation and climate change in our effort to prevent similar conflicts around the world."

global markets, and help protect biodiversity and the valuable ecosystem services from forests on which the poor depend. The World Bank estimates that one fourth of the wealth in developing nations comes from tropical forests and other natural ecosystems, and estimates that 90 percent of those living in extreme poverty depend on forests for some part of their food, fuel, water or livelihoods. [62] Those living in extreme poverty are the most vulnerable to economic hardships and social conflicts associated with climate change, and with deforestation and forest degradation. Healthy forests provide a buffer against storms, droughts and flooding, which are expected to intensify with further climate change.

In addition, in many parts of the world, the economic benefits of deforestation bypass forest-dwelling people as a result of corruption, land-tenure systems and limited local control. [63] New financial incentives to conserve

Finding: A global effort to reduce tropical deforestation quickly would help to address global poverty by channeling substantial new revenues to the billions of rural poor who depend on forests for their livelihood and by reducing the climate vulnerability of poor communities to drought, flooding and severe storms.

forests have the potential to improve the livelihood of forest dwellers and channel substantial benefits to local actors, if they are designed with appropriate safeguards to reduce corruption, improve local governance and land tenure and involve local communities from the outset. [64]

Ecological Benefits (Biodiversity and Ecosystem Services)

Tropical forests contain many of the world's last treasured natural places and are home to half of the world's known terrestrial species. [65] Biodiversity can also be critical for food, medicine and ecosystem health. New incentives for tropical forest conservation would help stem the world's extinction crisis, particularly if financial incentives were targeted towards high biodiversity landscapes. Forest conservation programs should also strive to maintain the physical connectivity of natural landscapes, particularly where large corridors are necessary to allow for seasonal migration and genetically diverse populations of keystone species. This is especially important for conserving large mammals such as elephants, rhinoceroses and orangutans, many of which require large intact areas to thrive. Importantly, the world's richest biodiversity areas

overlap substantially with some of the best places to implement forest carbon programs. This includes parts of Brazil, Southeast Asia and the Congo Basin, as shown in Figure 8.

Conserving intact forests would also preserve the "ecosystem services" they provide for local people, including food, water quality and filtration, air quality, soil retention, maintenance of precipitation patterns and fuel wood. This "natural capital" represents approximately one third of the wealth in low-income nations, and even more in the poorest nations, according to the World Bank,[66] yet two-thirds of the ecosystem services upon which humanity depends are threatened or stressed. [67] The Millennium Ecosystem Assessment (MEA) convened by the United Nations argued that while some people benefit from the economic exploitation of natural resources such as tropical forests, the costs borne by society are often much higher.

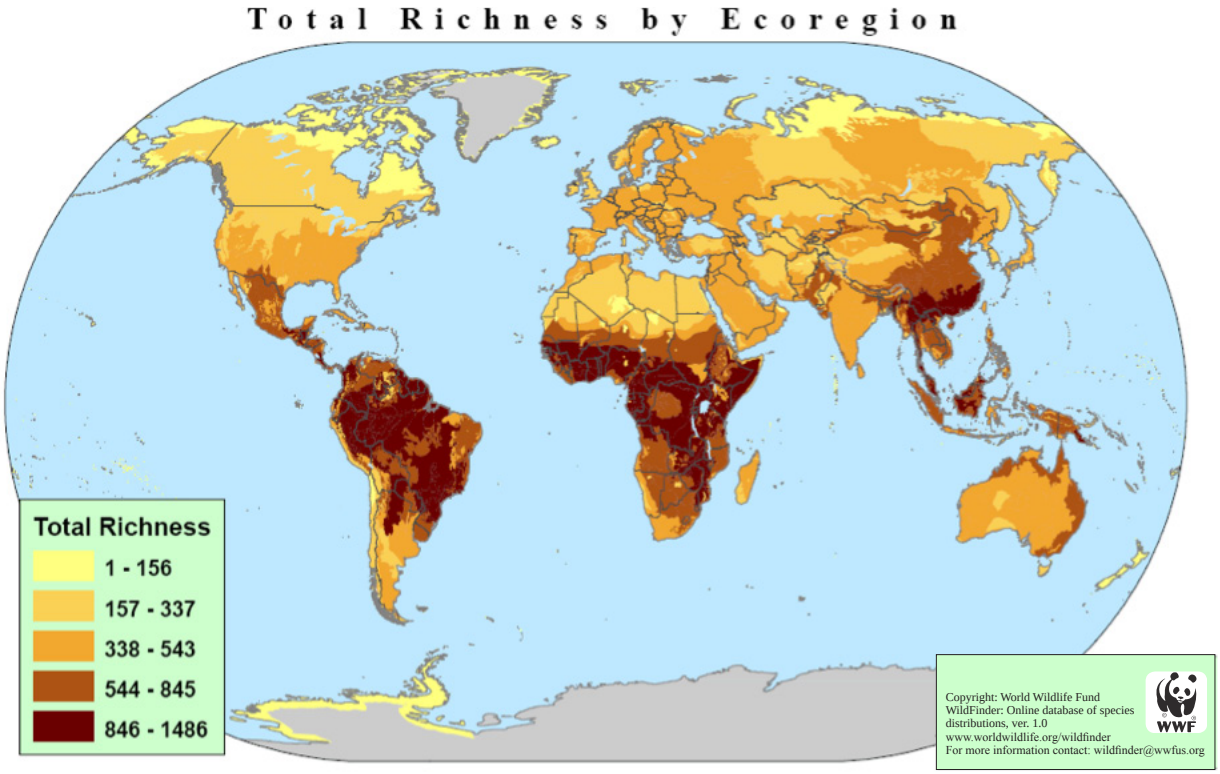
Commissioner Perspective:

CRISTIÁN SAMPER

Director, National Museum of Natural History

"The scientific case for the dealing with the impacts of climate change immediately and comprehensively could not be more clear, and tropical forests are an essential part of the solution. The destruction of tropical forests is at the crossroads of our two greatest environmental challenges: reducing greenhouse gas emissions and protecting the biological integrity of our planet. The global community, led by the U.S., must recognize the importance of these ecosystems by creating an international system to protect tropical forests, and ensuring that such a system is scientifically designed and verified. International and domestic climate policy cannot ignore this necessity and still succeed."

Figure 8: Global Biodiversity Richness



Source: World Wildlife Fund for Nature (2009) *Wildfinder.*

Financing Forest Emission Reductions

A successful policy response to tropical deforestation must alter the underlying economic incentives that drive deforestation. This section provides an overview of how a system of financial incentives to developing countries should evolve over time in a phased approach, the scale of funding needed and the role played by both public and private sector mechanisms. Upfront financing to catalyze action and economic incentives for verified reductions are both critical.

Finding: The United States needs to mobilize substantial new financial resources to alter the economic incentives that drive deforestation.

Phased Approach

Altering the "rules of the game" to make standing forests worth more than the pastures, fields and plantations that replace them will not be easy. The path to success will require tropical forest nations and developed nations to work together in several phases, which may not be entirely distinct but are useful for conceptualizing the path to verified reductions:

(1) Initial preparation and planning phase. Before making progress on reducing their forest emissions, countries will need to go through an initial preparation and planning phase, including new policy design, strengthening of national institutions, development of programs to channel benefits to local actors, stakeholder consultations and consensus building, field testing and evaluation. [68] In some cases, more comprehensive planning will be required to prepare for reforms in land ownership, tenure and

governance systems. Also in this first phase, strong local ownership of new forest-friendly development strategies will be absolutely essential, as well as developing the capacity and networks to accurately measure, report and verify forest stocks and emission reductions from forests. Developing nations simply will not pursue development strategies that feel as though they have been imposed by developed nations rather than having their origins in local interests and communities. This phase will require modest but critical upfront investments to catalyze action.

(2) Policy reform and implementation phase. In the second phase, nations will then need to finance and implement major policy reforms in order to bring about the behavioral changes and conditions that are necessary to unlock subsequent emission reductions. Examples include repurchasing timber concessions, investing in strong forest governance institutions and promoting alternative livelihoods to local communities. Like the first phase, the second phase will require upfront costs with modest initial benefits in terms of emission reductions. In some cases, "proxy" measures such as average carbon densities and deforestation rates could be used as a stepping stone to verified emission reductions to maintain a pay-for-performance focus. Unlike the first phase, the costs are likely to be substantial. Upfront financing will be needed, including from public sources during the early years of the program and in locations where risks are too high to attract private capital.

(3) Verified reductions phase. The third phase of action will require compensating nations that have the capacity, resources and policies in place for quantifying and verifying emissions reductions on a large scale through carbon-based pay-for-performance programs, including participation in carbon markets.

Principle: U.S. policies to reduce tropical deforestation should be compatible with a phased approach that initially involves technical assistance, then provides support for major policy reforms and culminates with the purchase of verified emission reductions, including through private sector carbon markets.

These phases should not be thought of as entirely separate and will be implemented at different rates according to national circumstances. Brazil, for example, is already pursuing activities in several phases simultaneously.

Success in reducing tropical deforestation will depend on mobilizing the resources from developed and developing nations needed to fundamentally realign public and private incentives. Investments are needed in each tropical forest country to modernize national and local forest institutions to better measure, monitor and verify the effectiveness of forest conservation programs, and to build the capacity necessary to implement major forest sector policy reforms. In many nations, significant funding is also required to strengthen forest governance, and to clarify land and carbon rights.[69]

Recommendation: The United States should create major new financial incentives and public-private partnerships to encourage forest conservation by developing nations and to finance emission reductions that the United States would otherwise have to make via far morecostly domestic strategies. The combined cost of all three phases is both measurable and substantial and will vary for each nation depending on a number of factors. Total global funding needs are estimated to gradually increase from at least $2 billion in 2010 to $10 billion in 2015 to $30 billion a year in 2020 and beyond.[70] Tropical forest nations should certainly contribute financially to their own emissions reductions, and many are already doing so. Nonetheless, the financial returns from deforestation are too immediate and the heightened risks from climate change are too diffuse for most developing nations to pursue a more climate-friendly development path absent new external incentives. Based on U.S. practice in other areas of international cooperation (e.g., contributions to the United Nations, World Bank and other international

organizations), the U.S. share would fall between 20 and 25 percent of the global total, or scaling up from at least $0.4-0.5 billion to $6-7.5 billion per year from 2010 to 2020. As elaborated in the later section "Designing U.S. Climate Legislation," based on analysis of existing U.S. legislative proposals, a total U.S. contribution of roughly $14 billion per year in 2020 would fully enable the cost containment and emission reduction benefits of reducing tropical deforestation detailed throughout this report.

So far, funding for initial needs (planning and capacity building) has come mainly through traditional foreign assistance programs. The amounts provided—several billion total pledged over the next five years—fall well short of what is needed for success in all phases. [71] Bilateral donations have come from a very small number of countries (Norway, the U.K., Australia and Germany), with Norway alone committing more than a billion dollars to support forest conservation solely in Brazil (and $2.5 billion globally).[72] The leading multilateral effort—the World Bank's Forest Carbon Partnership Facility—has raised another $150 million, including a $5 million contribution from the United States, and its new climate-related Forest Investment Program could be significantly larger. The United States does not yet have a focused foreign aid program that links climate and forests. However, it urgently needs to do its part to fill the immediate funding gap, for both environmental and economic reasons. International forests play too large a role in both increasing the ambition of proposed U.S. climate policies and containing their costs for the United States to leave the readiness of these nations to reduce emissions to chance.

Traditional U.S. foreign assistance alone will not suffice. Fourteen billion dollars per year for reducing emissions in tropical forest nations would represent a 100 percent increase in the U.S. development assistance budget. Using auction revenues from a domestic cap-and-trade program—whereby Congress allocates a certain percentage of the value of emissions allowances made available to the private sector, as is done in the climate bill approved by the House—offers a far more attractive option for an appropriately dedicated, large-scale funding stream for international forest conservation. These revenues could be used to support all three phases of action. A government-to-government program may also be essential to work with major countries like Brazil that oppose the use of forest-based emission reductions to offset industrial emissions. In addition, government funded programs could be designed to engage high-risk countries that private investors may ignore, such as the Democratic Republic of the Congo or Papua New Guinea, as well as countries with large forest stocks and low historical rates of deforestation that may not be suitable for market mechanisms. However, upfront funding before a cap-and-trade program potentially begins is also critical to catalyze action and allow the benefits of reducing emissions from tropical deforestation to be maximized.

Private Sector Investment and Carbon Markets

While higher levels of foreign aid and new, dedicated government programs are essential, private carbon markets are likely to present the largest-scale investment mechanism for international forest conservation. Under the cap-and-trade program outlined in the House climate bill, regulated companies would be allowed to offset their own emissions by financing emission reductions elsewhere. When done right, emissions trading programs harness private sector ingenuity to ferret out the lowest-cost emission reductions without sacrificing environmental goals. Indeed, by reducing overall costs, emissions trading programs allow companies to reduce emissions more quickly than they would otherwise, thus promoting more rapid environmental progress.

The United States made one of the pioneering efforts on emissions trading through the Clean Air Act in the early 1990s, allowing companies to meet new air quality standards at only a fraction of predicted costs and more quickly than expected. Through its Emissions Trading System (ETS), which now regulates almost half of Europe's CO_2 emissions, the European Union has taken the lead in allowing regulated entities to offset greenhouse gas emissions through qualifying investments in developing nations under the Kyoto Protocol's Clean Development

Mechanism (CDM). As noted above, projects that reduce deforestation are not allowed in this current system through 2012, although reforestation projects are included. Forest conservation offsets are trading in a variety of voluntary carbon markets—where companies voluntarily pay for emissions reductions without receiving compliance credit with regulators. These voluntary market investments were valued at $331 million in 2007, with forest carbon transactions a mere 3 percent of the total global voluntary carbon market.[73] Overall, voluntary market investments pale in comparison to the size of the compliance markets for carbon in Europe and under the Clean Development Mechanism, which reached $50 billion and $13 billion respectively in 2008.[74]

Commissioner Perspective:
MICHAEL MORRIS
Chairman, President and CEO, American Electric Power

"We must find solutions to address global warming in an economically viable way. Preventing deforestation and degradation in tropical regions is an important part of the answer — it is one of the most effective and inexpensive tools for addressing climate change and provides the best means of controlling the costs of other climate policies. Smart business planning demands action to prevent catastrophic climate change, but we must be certain that such action does not shake to its foundations an economy just beginning its global recovery. A commitment to protecting tropical and domestic forests as part of U.S. and global climate policy provides the cost-effective answer to the climate challenge."

Whether the United States chooses to reduce tropical deforestation through government spending programs, private carbon markets or, as is the case in the House climate bill, a combination of both, the political acceptability of these programs will depend on how these programs are understood by the American people. Programs that look like traditional foreign aid are unlikely to attract support, particularly during these difficult economic times. In contrast, the American people are far more likely to support cost-effective climate investments that protect the U.S. economy and U.S. jobs, contribute to solving the climate problem and advance other important national security and foreign policy objectives.

U.S. public and private resources should flow to nations that are doing their part to fight climate change by reducing deforestation in measurable and verifiable ways. With the exception of some initial funding for capacity building and early policy reforms, new U.S. funding from both private and public investments should pay for performance—measured in tons of emissions reduced. Public funds could also be used for stabilizing deforestation in countries with large forests but currently low deforestation rates. Although overseas financial flows associated with forest conservation could be substantial, these flows will be small compared to the sums involved in international trade of other global commodities, goods and services purchased by the United States.[75]

Both Public and Private Funding Mechanisms Needed

Finding: Public and private investments are both necessary to generate funds at the speed and scale needed to solve the problem, and to engage a wide range of countries that may be only be suitable for one type of funding.

Unfortunately, as noted previously, few developing nations, including even middle income nations like Malaysia and Mexico, are ready to participate in forest carbon markets, either because of governance, monitoring and enforcement issues or due to simple lack of planning and experience with environmental markets. One recent analysis has shown that accounting for risk, governance and market-readiness considerations dramatically changes which nations are likely to generate large quantities of cost-effective forest carbon

offsets.[76] While necessary, financing for capacity building alone will not solve these problems. Governments in developing nations will need to make a decisive political commitment to understand and address what is happening in their forests—including enforcing existing bans on certain activities.

This lack of market-readiness may suggest two conclusions. First, market and non-market investments may both be essential to achieve needed emission reductions in countries that stand a chance of attracting private sector investments and those that do not. Second, early investments (even pre-2012) are urgently needed to give policy makers and companies confidence that the potential cost containment benefits of international forest offsets will prove real and that U.S. carbon markets will not be choked off by limited offset supply.

Commissioner Perspective:
ALEXIS HERMAN
Former Secretary of Labor

"A low-carbon economy holds tremendous potential for American job creation – but we have to get there first. A smart climate policy would address the near-term costs of transitioning to clean energy, and protecting tropical forests as part of that policy provides a solution. Not only can we reduce a major source of CO_2 – we can also lay a solid foundation for a new economy built on energy efficiency, advanced renewable power, smart grids and beyond. The promise of that economy is boundless, but the debate over how best to prepare for that economy will remain incomplete until the constructive role of tropical forest protection is recognized. It's a win-win for our environment and our economy."

International Cooperation

Prior international efforts to conserve tropical forests have had mixed results. In recent years, many forest-rich developing nations have dramatically expanded their national park systems, extended other legal protections to heavily forested areas and carried out some forest sector reforms.

Yet despite these national-level actions, more than $1.1 billion invested in forest sector reform through the World Bank over the past decade, and larger sums provided directly by donor nations for forest conservation, global deforestation rates have not diminished.[77] Without new forms of concerted international action the next few decades will witness precipitous deforestation in the world's three major forested regions: the Amazon Basin, the Congo Basin and Southeast Asia.

Finding: Past international cooperation on tropical forest has achieved some success, but has been far too limited in scale and on the whole ineffective.

The G8 has taken modest initiatives to reduce illegal logging,[78] but that problem has also largely defied progress. Most heavily forested nations (including the United States) have resisted occasional calls by other countries to negotiate binding international obligations to conserve forests, as well as proposals to alter World Trade Organization rules to allow importing nations to give strong trade preferences to sustainably harvested timber. Prioritizing the enforcement of U.S. trade policies designed to combat illegal logging—especially the 2008 Lacey Act amendments discussed below—could provide a strong driver for change to the international system.

Making Progress on Forests in Global Climate Talks

The fate of tropical forests has also been discussed in global climate talks since the 1990s. During negotiations on the 1997 Kyoto Protocol, the United States, Japan, Canada and Australia strongly supported the proposition that investments in tropical forest conservation should count towards their Kyoto emissions reduction targets. Many other nations opposed this approach, and forest conservation projects were eventually excluded from the Kyoto agreement and European carbon markets, although less economical reforestation and afforestation projects were partially included. At the time, Europe questioned whether emission reductions from the forest sector were verifiable and feared that forest conservation might distract attention from the need to revolutionize the energy sector. Brazil shared these concerns (and still does), also opposing the inclusion of tropical forests in Kyoto because it worried that climate change rules might impinge on its national sovereignty in the politically sensitive Amazon region.

Finding: Tropical forests are a key point of discussion in ongoing global climate talks, and the United States is an active participant.

In 2005, a new coalition of small- and medium-sized rain forest nations seeking access to global carbon markets (formally known as the Coalition for Rainforest Nations or CfRN) convinced the international community to study whether tropical forests should be included in future climate agreements. Since that decision, the idea of integrating forests into overall climate policy has been far less controversial, partly as a result of advances in forest carbon science that have shown that emissions from deforestation are such a large part of the climate problem and given nations' greater confidence that emissions reductions can be adequately measured and verified. Most countries and climate experts expect that the next global climate agreement, which nations hope to conclude in Copenhagen, Denmark, in December 2009, will give significant attention to reducing emissions from tropical forests, including through new public- and private-sector financial mechanisms.[79] An informal working group has already been launched that is focused on providing interim financing before broader international efforts can be scaled up.[80]

The Obama Administration has developed principles regarding about how a new international climate agreement should seek to reduce tropical forest emissions.[81] The Administration supports including forests as one part of a comprehensive reduction strategy from all terrestrial sources—including agriculture—but recognizes that because of technical challenges a phased approach may be required with an initial focus on reducing rates of deforestation. It has also proposed using non-market and market financing to fulfill different objectives, with market financing that could be used for offsets carrying stricter measurement, reporting and verification standards.The Administration has yet to weigh in on a number of key issues. While the principles are somewhat general, it is clear that the Administration places a high priority on reducing tropical forest emissions.

Key Issues Remain Unresolved

Despite the growing political consensus, how a new global climate agreement would actually reduce emissions from tropical forests remains unresolved. Following are some of the big open issues.[82]

Land types. While forests have been at the center of negotiations, some nations have proposed

covering a wide range of land types (i.e., forests, wetlands, agricultural and grasslands), to create the most comprehensive system possible and broaden the number of nations that would receive financial incentives to manage their lands for carbon benefits.

Activities. Almost all nations wish to address emissions from deforestation, but many nations also wish to include forest degradation, reforestation and afforestation. The United States is one of the few nations supporting comprehensive terrestrial greenhouse gas accounting, covering all land types and activities. Brazil supports focusing primarily on deforestation, while most other countries favor including all forest sector activities, but not land-use activities that do not involve forests.[83]

Mechanisms. Many nations favor mobilizing funding through private sector-oriented carbon markets, but others argue for a system of government-to-government payments.[84] Brazil in particular has been staunchly opposed to a market-based system that would allow developed nations to substitute tropical forest conservation investments for domestic emissions reductions. Although some key nations have also been unclear or opposed, many other influential developing nations support transitioning to a market-based system after some initial public investments in planning, market readiness and implementation activities.[85]

Finding: Several important issues to striking a global deal on climate change and tropical forests remain unresolved.

Eligibility. Some proposals focus on nations with high deforestation rates, but others would also provide incentives for countries with low deforestation rates to maintain them.[86] The Bali Action Plan guiding current negotiations for the next global climate agreement allows for both approaches.[87] At present, these low deforestation nations are unlikely to gain access to lucrative carbon markets—which will likely require verified emission reductions—but these nations would be eligible for government-to-government assistance.

Scale. Many nations, including Brazil and the CfRN countries, wish to limit the most significant financial incentives to nations that have adopted strong nationwide programs to reduce forest emissions after a transition period. Some other developing nations object to this conditionality and favor allowing more ad hoc project-based approaches, or state- or province-wide approaches.[88]

Methodologies. Proposals also diverge on standards and procedures to ensure that emission reductions are genuine, particularly the setting of reference levels or baseline rates of deforestation for developing countries. Since payments would only be provided if countries improve upon these levels, they have a significant impact on the effectiveness and geography of forest conservation financing, including the eligibility issue discussed above. While these matters are quite technical, they are also politically important in global climate talks and infused with significant ideological content. Some countries support using historical deforestation data, but others favor using projected future rates.[89]

Designing U.S. Climate Legislation

Despite these differences, most countries expect the next climate agreement to include tropical forest conservation in a robust way.

The United States has a strong bipartisan tradition of supporting conservation of tropical forests. Most of the major U.S. programs to date were initiated by Republican

policy makers with enthusiastic Democratic support. Former Congressman Rob Portman (R-OH), for example, sponsored the 1998 Tropical Forest Conservation Act, which provides debt relief to developing nations that conserve tropical forests—so called "debt-for-nature swaps." President George W. Bush expanded that program significantly and appropriations now average $20 million per year.[90] The largest U.S. international forest conservation program is managed by the U.S. Department of State (State Department) via the Agency for International Development (USAID). Its Congo Basin Initiative, the agency's flagship effort, was launched by Secretary of State Colin Powell in 2002 and has helped central African nations place 115 million acres of tropical forests under improved management—more than the entire land area of California.[91] The United States also provides $20-$30 million annually for tropical forest conservation through the Global Environment Facility (a partnership between the World Bank and the United Nations).[92] In addition, the United States has supported international forests through its trade policies. In 2008, for example, Congress amended The Lacey Act of 1900 (named for Iowa Republican John Lacey) to help stop the importation of timber and forest products from illegal logging.[93]

While these bipartisan programs have had some success in conserving certain specific places, the scale and scope of these programs have paled in comparison to the global need. In fact, there is little evidence to suggest that global efforts, let alone U.S. programs, have had a demonstrable effect on tropical deforestation rates. Total annual U.S. appropriations for bilateral and multilateral tropical forest conservation programs have ranged between $80 and $100 million since 2000,[94] compared to the $30 billion a year that would be required annually to reduce emissions from tropical deforestation by half in 2020.[95]

Finding: The United States has a bipartisan tradition of protecting tropical forests, but support has been inadequate to address the problem at the scale needed.

The United States also has a strong bipartisan tradition of supporting the inclusion of tropical forests in climate

policy. While many of the Clinton Administration's climate policies were controversial, its efforts to include tropical forests in the Kyoto Protocol drew support from a broad spectrum of congressional leaders. When President George W. Bush removed the United States from the Kyoto process, he identified reducing tropical deforestation as a fruitful area for greater international cooperation. The Bush Administration also launched a number of promising but small-scale forest governance initiatives in partnership with Indonesia and other allies.[96] Modest incentives for public and private sector technology deployment in developing countries, including for carbon sequestration by forests, have also been included in U.S. energy laws such as the Energy Policy Act of 2005.[97]

The House Climate Bill (Waxman-Markey)

The climate bill (American Clean Energy and Security Act) developed by Representatives Henry Waxman (D-CA) and Edward Markey (D-MA) and approved by the House of Representatives in June 2009, if enacted into law, would reduce U.S. emissions 30 percent below 2005 levels by 2020 (including U.S. contributions to international reductions).[98] Most public attention has focused on what is arguably the centerpiece of that bill — a "cap-and-trade" system that would regulate emissions from 85 percent of the U.S. economy and allow regulated entities to engage in trading of emissions allowances to reduce costs. The cap-and-trade provisions alone would reduce U.S. capped emissions 17 percent below 2005 levels by 2020.

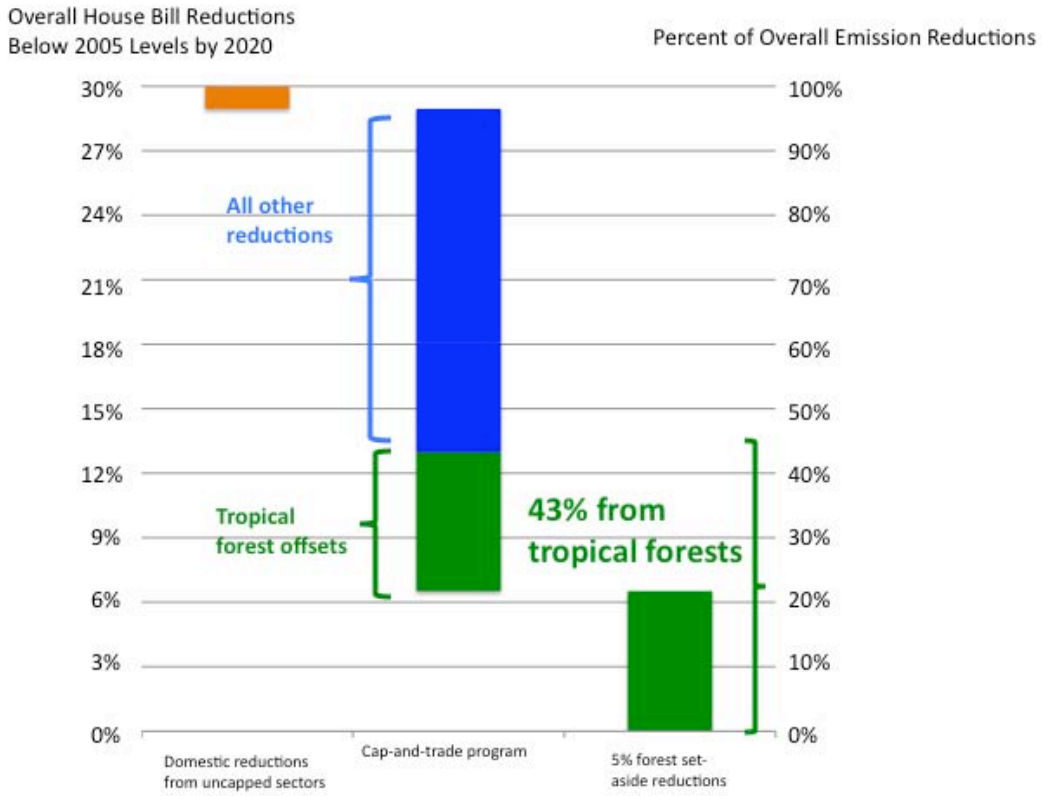
Tropical forests are at the heart of the House climate bill and could represent 43 percent of the total reductions achieved under the bill by 2020 (see Figure 9). [99] This means that if enacted in its current form, the House bill would channel an estimated $11-$18 billion in new funding for tropical forests annually by 2050 – a more than one hundred-fold increase in U.S. funding levels. [100] Reaching these high levels of funding requires substantial private investment in offsets, which is unlikely to occur at this scale without greater additional short-term financing for capacity building and market-readiness activities. These funding flows would greatly exceed any existing efforts by developed nations and would catapult the United States into a leadership role in conserving international forests. The funding level recommended in this paper—roughly $14 billion per year by 2020—is intended to represent a minimum, realistic level of what would be necessary to catalyze a global effort to reduce emissions from tropical deforestation

Finding: The climate bill recently passed by the House of Representatives places a strong emphasis on reducing emissions from tropical deforestation, including substantial public and private financing mechanisms.

by 50% by 2050, achieve zero net emissions by 2030, and allow the United States to capture substantial cost containment benefits from reducing tropical deforestation. In the event that U.S. funding under the House bill were to exceed this amount, it would only serve to increase these benefits.[101]

The House climate bill includes both public and private sector financing mechanisms for international forest conservation. [102] The public financing generated by the bill would be used to fund reductions from forest conservation that are in addition to those achieved by the U.S. domestic cap-and-trade system. Private sector financing would pay for "offsets" in place of U.S.

Figure 9: Percentage of Emission Reductions from Different Sources under House Climate Bill in 2020



Source: Climate Advisers analysis, based on data from U.S. EPA

domestic emissions reductions under the cap-and-trade system. The total emissions reductions attributable to tropical forests under the climate bill includes those achieved through both dedicated public funding and tropical forest offsets expected under the U.S. domestic cap-and-trade system.

Emission reductions purchased with public funding are mandated by the House bill to generate 720 million tons of emission reductions per year in 2020, equivalent to 10% 2005 of economy-wide U.S. emissions.[103] The quantity of tropical forest offsets purchased by the private sector would depend on market prices, but U.S. government estimates suggest that they could represent over 20 percent of emission reductions achieved by the bill.[104] The paragraphs below explain in some detail how these two funding mechanisms would work. The Obama Administration supports the approach taken in the House bill on tropical forests and inclusion of tropical forests in the new global climate agreement being negotiated by the international community.[105]

Public financing. The House bill sets aside 5 percent of tradable allowances from the cap-and-trade program to finance U.S. government investments in tropical forest conservation programs from 2012-2025, declining to 3 percent from 2026-2030 and 2 percent from 2031-2050. Based on government estimates of likely allowance prices in U.S. carbon markets, this "set-aside" mechanism would likely generate $3.1 billion in 2012 and $5.1 billion in 2020 and decline back to initial levels in subsequent years (see Table 1). The regulation and distribution of this funding would be under the authority of the U.S. Environmental Protection Agency (EPA) Administrator, in consultation with other government agencies including the Secretary of State and the Administrator of the U.S. Agency for International Development. Importantly, the EPA Administrator would be required to manage these funds in such a manner as to purchase at least 720 million tons of verified emissions reductions from tropical forest conservation each year from 2020-2025, and a total of at least 6.0 billion tons from 2012-2025. The objective of this specific requirement is to ensure that the set-aside mechanism finances international emission reductions equivalent to reducing U.S. emissions an additional 10 percent below 2005 levels in 2020. These reductions would be above and beyond the reductions achieved through the cap-and-trade program.[106]

The House bill indicates that one permissible use of the set-aside funding would be to prepare developing countries to sell verified emission reductions to the United States government and/or to help them participate in U.S. carbon markets as "offset" providers to U.S. companies. In order to receive any funding from the set-aside program, developing countries would be required to enter into a bilateral or multilateral climate agreement with the United States covering forest sector emissions. The EPA Administrator is allowed to distribute international forest set-aside monies through multilateral funds and institutions that are pursing comparable objectives, provided they have adequate safeguards for indigenous communities and high standards for environmental integrity.

Table 1: Estimate of International Financing from Allowance Allocations in House Climate Bill.[107]

	2012	2020	2030	Total (2012-2020)	Total (2012-2050)
International Forest Conservation Funding[108]	$3.1 billion	$5.1 billion	$3.5 billion	$38 billion	$131 billion

Source: Climate Advisers analysis, based on allowance price estimates from U.S. EPA and the Congressional Budget Office

Private financing. The House bill would also allow U.S. regulated companies to "offset" their own domestic emissions by investing in emission reduction activities internationally or at home in uncapped sectors (mainly domestic agriculture). These offset provisions would permit U.S. companies to finance emission reductions outside the U.S. cap-and-trade program in lieu of lowering their own capped emissions. International offsets (those involving emission reductions outside the United States) are restricted each year to 1.0 billion tons total and to a defined percentage of each firm's compliance obligation. Companies would be allowed to purchase up to 1.5 billion tons of international offsets if EPA finds that fewer than 900 billion tons of domestic offsets are available in a given year, provided, however, that total offsets do not exceed 2.0 billion per year from domestic and international sources combined. According to EPA, "Without international offsets, the allowance price would increase 89 percent relative to the core policy scenario." [109] Although these international emissions reductions may originate from a variety of sectors (i.e., transport, electricity, manufacturing, mining, agriculture and waste management), it is likely that 60 percent of international offsets will come from investments in tropical forests. These high numbers reflect the relatively low cost of reducing deforestation and promoting reforestation compared to other near-term international mitigation opportunities. In addition, beginning in 2017 firms are required to submit 1.25 tons of international offsets to substitute for 1 ton of domestic compliance, as a means of promoting stronger domestic action and leveraging limited U.S. funding internationally.

Principle: U.S. policies to reduce tropical deforestation must advance cost-effective solutions.

The emission reductions and funding levels that U.S. private sector investments in tropical forests would generate under the House climate bill would depend on the total number of forest sector offsets used, which in turn would be driven by the relative price of domestic and international emissions reductions, the supply of forest sector emission reductions and the readiness of developing nations to participate in carbon markets. U.S. government projections of total international offset use in 2020 vary widely from only 340 million tons (by the Congressional Budget Office) to about 1.0 billion tons (by EPA). This means that private-sector forest conservation funding would likely range from $6-$13 billion in 2020. [110]

Although they are the best estimates available, these supply and funding projections are still very uncertain, as they rely on significant assumptions and not robust, concrete analyses. Offset supply is most unpredictable in the early years from 2012-2019, when few nations may be ready to implement needed programs and participate in highly regulated carbon markets. Private sector funding would likely increase steadily as countries sort out their internal politics, gain governance and technical capacity, and then start showing results. In fact, without the capacity building activities financed by the set-aside program discussed above, the supply of international forest sector offsets would likely to be smaller than U.S. companies need to keep their compliance costs down under the cap-and-trade program. The House bill would also condition participation in U.S. carbon markets and the sale of "offsets" on a country having entered into a bilateral or multilateral climate agreement with the United States that covers the forest sector.

It must be noted that despite the exceptionally important role tropical forests would play in both reducing the cost of the House bill (hundreds of billions of dollars) and in increasing the environmental ambition of the bill (a full 50 percent higher), tropical forests were not a major part of the political debate in the House. It would be premature to conclude, therefore, that the House is strongly in favor of including tropical forests in future climate legislation and would defend international forest provisions in any compromise with the Senate.

Prospects for Senate Action

Prospects for Senate action on climate legislation remain uncertain. President Obama has called on the Senate to approve legislation quickly so that Congress can send him a climate bill to sign into law. The Administration

is eager to secure enactment of climate and energy legislation, including a cap-and-trade program, before global climate talks in Copenhagen in December 2009. Senate Majority Leader Harry Reid (D-NV) previously promised a floor debate on climate legislation in October 2009, but recently announced they would act as soon as possible without providing a specific deadline. At the same time, it is unclear whether or how proponents of climate legislation can secure the level of support needed to adopt a climate bill in the Senate. Senate moderates in both political parties, whose votes would be essential, continue to have concerns about the economic cost and competiveness impacts of climate action.

Quick action by the Senate is desirable to spur action by other nations, avoid dangerous climate change and reestablish America's leadership role. The House climate bill provides a good starting point for Senate deliberations. If the Senate declines to adopt a climate bill this year, the reality of climate change and the need to find workable solutions will persist and continue to demand the Senate's attention in the years ahead, particularly if the Obama Administration begins regulating emissions without the Congress through the Clean Air Act, as many experts and advocates predict. The full Senate has yet to engage in a robust examination of how tropical forest conservation fits in to U.S. climate policy. During discussions on the Boxer-Lieberman-Warner bill in 2008, some Senators expressed concerns that international forest conservation programs might not produce genuine emissions reductions, and others opposed as a matter of principle sending billions of dollars overseas for what they viewed as uncertain benefits. A 2008 survey of the most engaged congressional climate change staff, primarily in the Senate, revealed that these concerns were widespread and crossed party lines.

Finding: Although many stakeholders and policy makers are supportive, the U.S. Congress has yet to have a robust debate about the role of tropical forests in climate policy.

Over the years, Senators have received a mixed message from stakeholders on the role of tropical forests in climate policy. In recent months, however, the politics associated with climate and international forests have begun to shift. Two major coalitions of Fortune 500 companies and influential environmental groups — the U.S. Climate Action Partnership and the Tropical Forests and Climate Coalition — have put forward policy recommendations broadly in line with the approach to international forests taken in the House climate bill. The support of these groups was instrumental in securing House approval of the international forest provisions described above. Climate and forest cooperation efforts are also moving ahead among a group of ten U.S., Brazilian and Indonesian states and provinces. Their primary objective has been to develop recommendations about how international forestry credits should be treated under California's state climate law, which could dovetail with a future federal climate change rulemaking process. While it would be premature to assume Senate action on climate change, let alone approval of ambitious tropical forest programs, the question before the Senate appears to be shifting from a debate over whether new climate laws should help reduce global deforestation to a discussion of how to achieve that outcome.

In crafting its policy recommendations, the Commission assumed that for the time being climate policy discussions in the United States would continue to center on "cap-and-trade" proposals, under which the federal government would set emission limits (cap) but allow regulated companies the opportunity to reduce costs by buying and selling emission allowances (trade). Cap-and-trade is the centerpiece of the American Clean Energy and Security Act, approved by the House of Representatives on June 26, 2009. It is also the approach endorsed by President Obama, and is expected to be the focus of Senate debate in the months ahead. A well-designed cap-and-trade program would provide an effective mechanism for financing and implementing the recommendations articulated in this report. However, the prospects for (and timing of) Senate approval of a national, economy-wide cap-and-trade bill are uncertain. Because the possibility of a cap-and-trade program is very real, the Commission has developed specific recommendations that would allow the United States to harness that approach to help reduce tropical deforestation.

Recommendation: The United States should allocate 5 percent of the value of tradable emission allowances in a cap-and-trade program to new international forest conservation programs. Reducing emissions from tropical deforestation in partnership with developing nations by 50 percent within a decade and achieving zero net emissions from forests by 2030 will require sustained U.S. leadership. The United States is uniquely positioned among developed nations to catalyze an effective global response given its strong history of bipartisan cooperation on tropical forest conservation, its long record of leadership on forest issues in global climate negotiations and its enormous need for an early, steady supply of international forest carbon offsets to keep domestic climate policies affordable. Historically Europe has been less supportive of integrating tropical forests into climate policy, although that has recently changed. Other major industrialized powers would stand with the United States but are unlikely to achieve a globally successful forest conservation partnership without its active involvement.

To play a leadership role, the United States will need to invest substantial financial resources. The scale of funding, of course, should match U.S. policy goals and is best calculated with specific needs in mind.

U.S. investments with public resources are needed in the following four areas and amounts.

- **Upfront funding for building capacity and reforming policies in forested developing nations to help them produce verifiable emission reductions and participate in U.S. carbon markets.** Capacity building and policy reform are likely to require at least $1 billion from the United States between now and 2012. This sum represents roughly 25 percent of the at least $4 billion global need by 2015 that has been estimated, a level generally in line with past U.S. foreign aid practices. However, given the likelihood of a U.S. cap-and-trade system starting in 2012, and the immediate need for verified emission reductions, it would be in the U.S. interest to catalyze global efforts with an early funding commitment.[115]

- **Helping forest-rich developing nations with low deforestation to avoid increases in deforestation despite mounting economic pressures.** Given current deforestation rates in some forest-rich nations and potential increases driven by economic activity and reductions elsewhere in the world, providing incentives to such nations is likely to require roughly $5 billion globally per year by 2020. The U.S. share of this would likely be at least $1 billion per year.[116]

- **Supporting action in low governance, high-risk countries that will likely be unable to attract private sector investors, including many nations in Africa.** Reducing international forest emissions by 50 percent within a decade and achieving zero net emissions by 2030 will require substantial action by a broad group of nations. Depending on the countries participating in carbon markets, the United States may need to finance with public monies 0.5 billion tons of emissions reductions annually from non-market nations to meet the goals of a U.S. cap-and-trade system similar to that in the bill passed by the House. Combined with support for policy and governance reforms, the total global cost of engaging these non-market countries could exceed $5 billion, with the U.S. share being roughly $1 billion annually by 2020.[117]

- **Financing verified emission reductions from nations that may not participate in U.S. carbon markets, including Brazil.** Halving tropical forest emissions by 2020 and eliminating them by 2030 will require at least 80 percent emission reductions in Brazil and other countries that have the capacity and political will to act, and achieving zero net deforestation in later years. With at least 1 billion tons of reductions annually from Brazil alone by 2020, and several hundred million from other nations, these low-risk, non-market countries will require at least $12.5 billion per year, with a U.S. share of at least $3 billion.[118]

The sum of these public funding needs is approximately $5 billion annually by 2020. Generating this level of public funding will not be possible through traditional

foreign assistance programs. Setting aside a share of the allowance value of emission allowances auctioned in a cap-and-trade program, as the House climate bill would do, could provide this level of funding in a highly reliable manner. Government estimates indicate that the 5 percent of emission allowances devoted to international forest protection in the House bill would generate $3.1 billion in 2012 rising to $5.1 billion by 2020. If the Unites States adopts cap-and-trade legislation, the Senate should also set aside this percentage of tradable emission allowances to fund international forest programs.

Recommendation: To lower the cost of U.S. climate action, the United States should permit regulated U.S. companies to "offset" a substantial portion of domestic emissions through investments in tropical forests. In this manner, the U.S. policy should mobilize roughly $9 billion annually from private investment to save U.S. companies up to $50 billion by 2020. In the long run, U.S. private sector financing can and should outpace U.S. public funding by a good measure. The United States can reduce the cost of climate action by hundreds of billions of dollars over the next decades if it allows regulated companies to offset a substantial portion of domestic emissions by investing in tropical forest conservation. The U.S. Climate Action Partnership, the leading coalition of major companies and influential environmental organizations, has called on Congress to initially allow up to two billion tons of emission reductions annually as a cost-saving measure and permit this amount to be increased by 1 billion tons if necessary to further manage costs. The House climate bill could permit up to 1.5 billion international offset tons to enter U.S. compliance markets. By most estimates, these figures are roughly in line with what is needed to keep new climate legislation affordable.

The Commission estimates that investments of roughly $9 billion annually by 2020 from the U.S. private sector are needed to finance cost-saving offsets from reducing tropical deforestation. Achieving this goal under the House climate bill could help reduce climate costs faced by U.S. companies by up to 50 percent, saving up to $50 billion annually by 2020.[119] The House climate bill could achieve and possibly slightly exceed these goals (mobilizing $6-13 billion per year by 2020 in private sector investments). The high end of this range would only be possible with substantial upfront public investments to unlock potential savings from forest carbon. Provided they do not detract from efforts to reduce domestic emissions, even higher amounts of private sector offsets and investments would be desirable, producing additional climate, economic, national security and biodiversity benefits for the United States.

Recommendation: To unlock these savings, the United States should invest at least $1 billion before 2012 in programs that would build the capacity of developing nations to reduce forest-sector emissions. As discussed throughout this paper, the United States and the world need to support the efforts of developing countries to create national deforestation reduction plans, as well as undertake some of the policy and governance reforms necessary to implement these plans. Since the availability of low-cost forest offsets is so important to containing the cost of U.S. climate policy, especially in its early years, this funding should be provided before 2012. A funding commitment of $1 billion by the United States would make up about 25 percent of the expected global need for these pre-2012 activities, and would catalyze additional commitments from other developed nations. A more detailed rationale for this specific funding level was presented earlier in this report.

Recommendation: The United States should channel new forest conservation investments to high priority areas for national security, poverty alleviation and biodiversity conservation. Earlier portions of this report demonstrated how well-designed forest conservation policies would advance vitally important U.S. national interests beyond climate change, including by helping to strengthen international security, improve living standards, protect biodiversity and safeguard valuable ecosystem services. But not all forests are equal. Some forests contain more biodiversity than others. The rainforests in the Amazon-Andes region hold many more endemic species as equally carbon rich forests in some other parts of the world. Some forests, such as those that contain water sources for major cities, are more important than others to economic development. Reforestation in weak or

fragile states such as Afghanistan, Pakistan, Kenya and Tanzania, for example, would yield greater development and security benefits than would similar activities in more stable nations. The forested watershed that enables transit across the Panama Canal, for example, is of greater global economic and security significance than a potentially far larger but indistinct forest elsewhere. Conserving this forested watershed, as existing U.S. policy seeks to do, is a high priority. From a geopolitical perspective, the United States may simply have more at stake in some parts of the world than others. In addition, not all forest conservation activities produce the same benefits. Restoration of natural forests provides greater ecological benefits than planting trees for future cultivation, although both types of activities may sequester similar quantities of carbon.

Principle: U.S. policies to reduce tropical deforestation must further the economic development objectives of developing nations.

U.S. climate policy, therefore, should be designed to maximize the biodiversity, economic development, and security benefits of reducing deforestation without detracting from emission reduction objectives. This can be achieved by creating policy frameworks that encourage investments in the highest priority countries and places. Congress should consider making sure that new climate laws contain criteria for the Executive Branch to apply when exercising discretion about where to direct U.S. funding. The Executive Branch should report to Congress on the measures it is taking to focus U.S. funding in ways that maximize climate, national security, biodiversity, economic development and humanitarian benefits. Together, these mechanisms would help ensure that the forests that are most important to advancing a broad range of U.S. national interests receive an appropriate share of available U.S. funding.

Incentivizing Local Action

In order to be successful in the long-term, U.S. forest conservation programs must provide substantial, measurable benefits to the 1.6 billion people around the world who depend on tropical forests. This means protecting the rights and interests of indigenous communities and the rural poor, while also contributing to broad and sustainable economic growth in tropical forest countries. Not only are these the right things to do and essential to the success of financing mechanisms, but failures here will undermine the delivery of forest emission reductions and could produce a strong backlash against the United States, American companies and international climate policies.

Under evolving international norms and national laws, governments owe extra protections to indigenous communities, which are now organizing both locally and globally on climate policies relating to tropical forests.[120] These concerns reflect international norms embodied in the United Nations Declaration on the Rights of Indigenous Peoples, the broadly accepted global statement of the special rights and interests of the indigenous.

While the primary responsibility for protecting the rights and interests of local people rests with developing nations, the United States also has a role to play, particularly since new U.S. financial incentives would be a primary driver in new land-use decisions. The challenge will be determining the right role — one that helps make climate policies good for the global poor and vulnerable local communities and fully supports developing country efforts to implement new forest conservation programs in ways that protect the human rights of their citizens and strengthen their democracies, including by improving transparency and public participation in decision-making processes.

Principle: U.S. policies to reduce tropical deforestation must help local, forest-dependent people, including the indigenous, by improving local living standards and promoting sustainable development objectives.

The United States could ask developing nations to demonstrate that they have created robust opportunities for public participation in decision-making processes and have put in place credible and transparent procedures for measuring, reporting and verifying the impacts of climate-related forest conservation programs on local communities. As in many other areas of international relations, sunshine is likely to be the best disinfectant. Transparency and public participation can be important keys to local accountability. Many developing nations are striving to strengthen their practices in these areas and the United States should work actively to support them.

This broader approach is likely to be more effective than the United States requiring developing nations to affirmatively demonstrate that they are meeting a list of conditions in order to access funding. Under this alternative approach, countries would not be eligible to participate in U.S. programs unless the President or Secretary of State certified to Congress that national practices in certain areas were in line with U.S. expectations and international standards. This approach is less desirable for political and practical reasons. Politically, it could be criticized by the majority of developing nations as an inappropriate intrusion on their sovereignty. If other nations sought to impose a similar system on the United States we would surely

object. Moreover, a fixed set of conditions about how to provide benefits to forest-dependent people could not adequately accommodate the diversity of national circumstances. The semi-autonomous relationship between the indigenous communities of the Amazon and their national governments is entirely different in character from the relationship between national governments and most forest-dwellers in Indonesia or the Congo Basin. Furthermore, from a practical perspective, the United States lacks sufficient information to accurately assess the appropriateness of very place-specific land-use decisions in remote forested communities.

Commissioner Perspective:
NANCY BIRDSALL
President, Center for Global Development

"Climate change is an immediate crisis already affecting millions of the world's most vulnerable people. With other nations, the United States has an opportunity to shape a strong international response that takes advantage of the multiple co-benefits to economic growth and social change of reducing deforestation in developing countries, and the plain and simple economic reality that doing so is among the cheapest and most effective single vehicles for reducing emissions on the table for the next decade and beyond. A U.S. response should (1) be organized in full partnership with Brazil, Indonesia and other forested countries; (2) should avoid the indignities and ineffectiveness that plague traditional foreign aid programs — opting instead wherever possible to a businesslike approach of paying for measured outcomes not the latest "favorite" inputs; and (3) should respect the perspectives, priorities and knowledge of the people who depend on sustainable forestry for their livelihoods."

Recommendation: The United States should work to ensure that international agreements and financial incentive programs place special emphasis on transparent and credible procedures for evaluating whether local people are participating in and benefiting from new policy frameworks. The United States should work in a supportive role with developing nations to outline procedures for consulting local communities and reporting on the impacts of forest conservation programs. The international community and the United States could then assess these reports and determine whether appropriate procedures were followed and evaluate whether the impacts of U.S. and global policy are creating unintended consequences. National reporting and international review should occur periodically to help promote constant improvements and catch problems early. Different procedures could be necessary for public and private investments.

Substituting transparency and public participation for conditionality as the guiding framework of U.S. policy in this area would produce several benefits. First, it would give the citizens of developing countries, rather than the United States, the responsibility for determining whether or not these programs are benefiting them. This would give them greater ownership over forest conservation policies but also reduce the potential risks to the United States or American companies if programs are not working as intended. Second, developing nations are in a much better position than the United States to know what is going on in their countries. Under a system of conditionality the United States would need to go in and investigate whether conditions are being met, but under a system of transparency and reporting each country would have that authority and responsibility. Finally, conditionality of foreign assistance programs has a long history of resentment from developing nations. The international community has moved towards empowering developing countries to do better themselves and incentivizing good performance rather than imposing highly restrictive external standards.

Finding: There are real challenges to ensuring U.S. tropical forest conservation policies benefit local people, but workable solutions exist.

The climate bill approved by the House includes provisions to protect the interests of local people and indigenous communities. The EPA Administrator, in consultation with the Administrator of USAID, must promulgate regulations establishing standards to ensure that U.S. tropical forest conservation programs give due regard to the rights and interests of local people, include them in consultations on design, planning, and implementation, and seek to share financial benefits with them.[121] The bill requires the Executive Branch to both follow these standards in distributing funding and ensure as much as possible that developing nations are following them in program implementation. However, the House bill does not make public participation and transparency the primary objectives for these regulations and standards. This is an area the Senate and the Obama Administration should revisit and address.

Environmental Safeguards

Poorly designed or managed forest conservation programs could jeopardize important U.S. national interests. Programs that offset U.S. domestic emissions reductions could send money overseas for no environmental benefits if measurement, monitoring and verification systems are inadequate. Approaches that fail to strengthen forest governance, transparency and public participation in developing nations could encourage corruption, harm indigenous communities and provide few development benefits.

Finding: Although the risks of inadequate environmental safeguards are serious, they can be effectively managed.

Programs that do not consider the indirect effects of major new financial incentives could convert agricultural lands into forests in ways that reduce crop yields, raise food prices or heighten food insecurity. Thus, strong safeguards for the environment and people are essential to ensure that new U.S. tropical forest conservation policies are effective, economically beneficial for developing nations, and advance broader U.S. national security interests. New forest conservation programs will not work on autopilot. However, good solutions exist that can effectively manage these risks.

Principle: U.S. tropical forest conservation policies must have robust environmental integrity.

Appropriate environmental safeguards are essential to guarantee that forest conservation programs achieve real reductions in greenhouse gas emissions and advance other environmental objectives, such as biodiversity conservation. Following are several key risks and associated feasible solutions.

Non-additionality. Payments could be provided for forests that never would have been cut down or for reforestation that would have occurred anyway. This can be addressed with appropriate crediting "baselines"—the reference level against which financial incentives would be provided—that compensate nations for actions that are above and beyond business-as-usual outcomes.

Leakage. Deforestation could simply shift from one place to another, either within the same country (activity leakage) or to another country (market leakage). This can be addressed by encouraging national-level actions and engaging as many tropical forest nations as possible, including "high-forest, low-deforestation" countries that might otherwise see an increase in deforestation as rates come down in other nations.

Non-permanence. Conservation benefits could be short-lived as a result of forest fires, poor forest management, policy changes or the impacts of climate change. This can be addressed with certain types of insurance, discount rates or "buffers."

Improper crediting baselines. Poorly set crediting baselines could result in large payments that are not warranted. This can be addressed with close attention to historical and projected future rates of deforestation.

Habitat conversion/Loss of biodiversity. Perverse incentives, such as incentives to convert non-forested land into forests, could encourage the loss of critical biodiversity and ecosystem services if developing nations turn species-rich native grasslands and wetlands into industrial forest plantations. This can be addressed by using eligibility criteria and environmental assessments that channel investments toward regions and practices that help conserve biodiversity and critical ecosystems.

These are serious concerns that will need to be addressed in a very credible manner by any new U.S. climate policies that target tropical deforestation. Different safeguards could be required for public and private financing mechanisms. The House climate bill makes a good faith effort to address these concerns and it has attracted the support of a number of major environmental organizations that have historically opposed including forests in a domestic cap-and-trade program.

Recommendation: U.S. policies should provide incentives for countries to move to national-scale action as quickly as possible. The House bill includes a phased transition for countries to move from sub-national to national-scale actions in order to continue participating in U.S. programs. Programs that cover less than a nation's entire forest sector may be allowed into the U.S. system during this transition. This approach was designed to move countries through the three phases of action—planning, implementation and verified emission reductions—as quickly as possible, while also recognizing the need to encourage swift action and provide companies immediate access to low-cost international offsets.[122] Several major electricity utilities and influential environmental organizations have also embraced an approach with phases that transition nations from sub-national- to national-level actions—although not precisely in the same manner as that taken by the House bill. A transitional approach with phases would have many advantages, including encouraging large-scale action by developing nations. One important benefit of managing forest-sector emissions at a national-scale would be minimizing the risk that forest conservation programs simply shift reforestation with a country from one place to another (a version of carbon "leakage"). The Commission, therefore, recommends that policy makers adopt an approach that moves nations in phases through a transition from sub-national- to national-level actions in the forest sector.

Overall, there are plenty of reasons to be optimistic that the United States can put in place credible environmental safeguards. Major scientific advances in earth observation technologies are creating new confidence that forest cover and carbon content can be measured remotely with satellites at a reasonable cost and with surprising accuracy. Providing this technical expertise could be one area for a substantial U.S. contribution to the international forest conservation effort. Several leading global conservation organizations can point to numerous successful pilot programs to reduce deforestation in ways that produce measurable, verifiable emissions reductions.[123] Some leading U.S. conservation organizations, moreover, have joined with major American corporations to develop technical standards that are widely used today in voluntary markets for forest carbon.[124] These voluntary market standards and certification processes provide a foundation upon which U.S. agencies can build when designing technical standards in new federally managed programs.

Implementing forest conservation programs only in countries that can verify actual reductions in their forest emissions could perversely accelerate deforestation in countries with large standing forests but currently low deforestation rates, such as those in the Congo Basin. A global forest conservation system will be seriously undermined without addressing these areas, and the participation of these "high-forest, low-deforestation" countries is therefore critical. However, paying countries for maintaining standing forests does not achieve

actual emission reductions that count toward U.S. or global mitigation goals and therefore cannot easily be financed through an offset mechanism. Providing incentives for these forest-rich, low-deforestation countries must therefore be a primary goal of U.S. and international public funding. Given this importance, creating a dedicated "stabilization fund" for these countries through U.S. legislation or global agreements is essential, especially since partnerships with many of them could also provide national security and other benefits.[125]

Climate change safeguards are not the only environmental protections that will be required. Special criteria may be helpful to make sure that new U.S. forest conservation programs help developing nations protect critical ecosystems and globally significant biodiversity. This could be done in a number of ways. Reforestation programs could guard against the introduction of non-native species, and afforestation programs (that convert non-forested lands to forests) could require environmental impact assessments. Special preferences could be created for investments in biodiversity "hotspots" or other high priority conservation areas and for the preservation of old-growth forests and native species as compared to managed forests and plantations.[126] These criteria could be applied differently in public and private emission reduction programs.

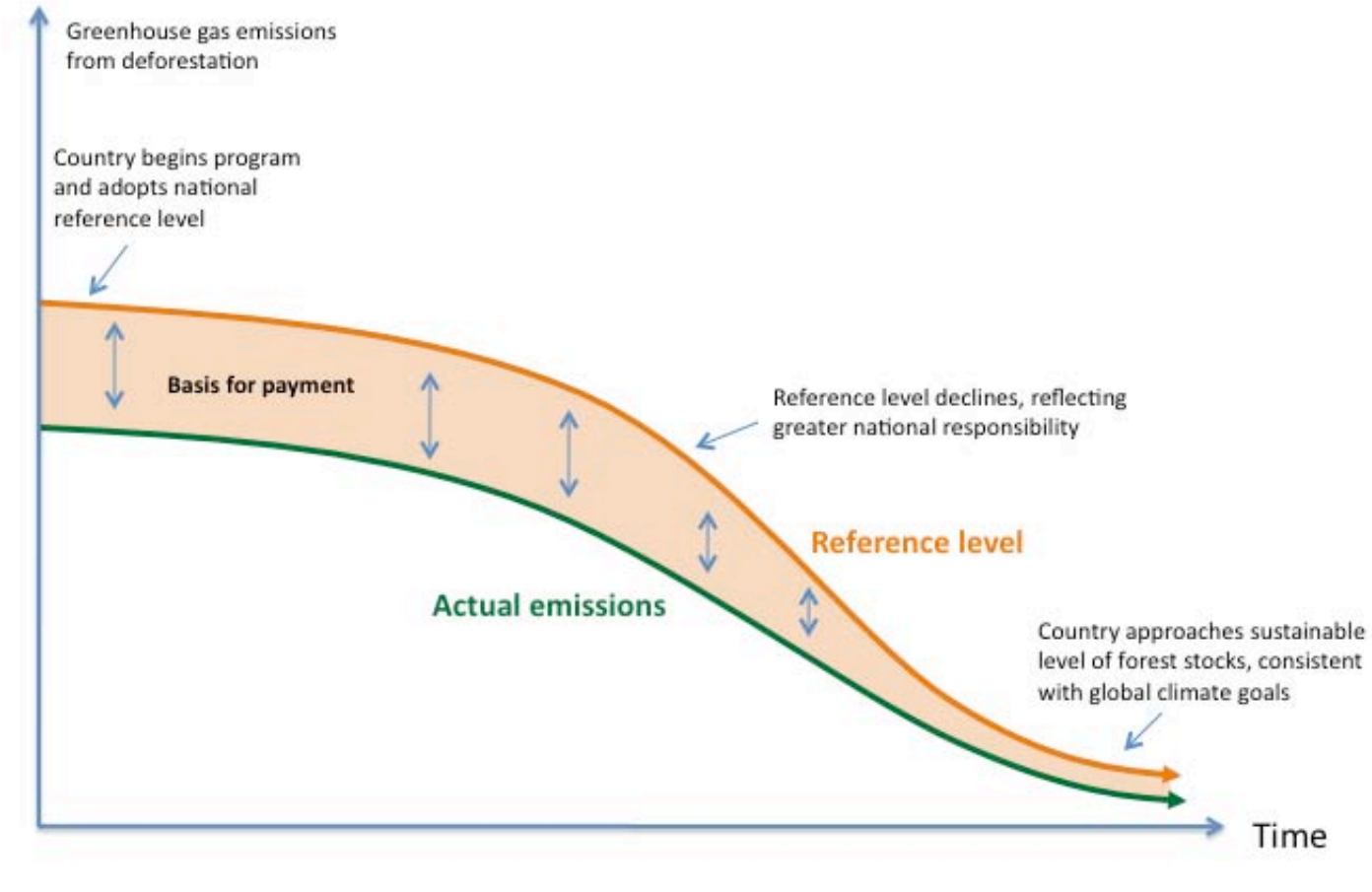
U.S. Climate Diplomacy and New Agreements

The preceding discussion has focused primarily on emerging U.S.-driven initiatives, primarily under likely domestic climate legislation. Domestic deliberations are occurring, however, in parallel to global climate negotiations and bilateral climate talks with key countries, including Brazil, China and India. Multilateral and bilateral negotiations provide vital opportunities for the United States to advance tropical forest conservation objectives in ways that extend well beyond domestic legislation. This section suggests how the United States should pursue those diplomatic opportunities. Issues relating to U.S. international negotiating objectives are also highly relevant to domestic climate legislation. The House climate bill, for example, would require that in order to be eligible to receive either public funding (i.e., the 5 percent set-aside of allowances for forests) or private funding (i.e., carbon market offsets) a developing nation must be part of a bilateral or multilateral agreement covering forest sector emissions that includes the United States. This would mean that the arc of U.S. climate diplomacy would influence the effectiveness and geographic footprint of the forest provisions in domestic climate laws.

Finding: Negotiating effective international agreements will be critical to the success of U.S. forest conservation programs.

The most important negotiating objective of the United States on tropical forests should be to ensure that net forest sector emissions in developing nations decline fast enough to allow the world to meet long-term emission reduction objectives. International agreements that do not help developing nations move aggressively toward the goal of halving deforestation in ways that are supportive of their own sustainable development objectives may be counter-productive. For example, an agreement that provided major financial incentives to high deforestation nations for simply not increasing deforestation rates by 2020 would potentially send billions of dollars abroad for relatively little climate action. Thus, a key element of new climate agreements dealing with international forests will be the reference levels or baselines against which progress is measured and financial incentives are provided. International agreements should require that developing nations create and implement credible, domestically enforceable national plans that are

Figure 10: Reference Levels



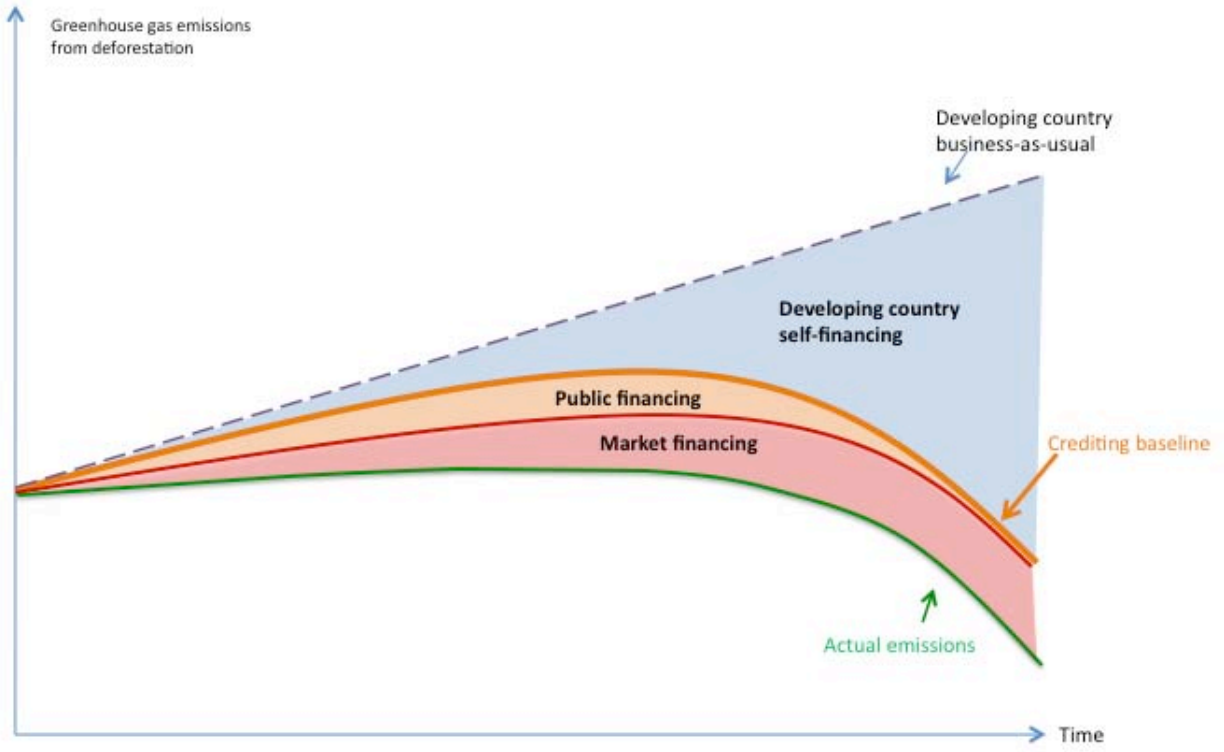
Source: *Climate Advisers analysis, based on Eliasch, J. (2008) Climate Change: Financing Global Forests, United Kingdom, Office of Climate Change.*

consistent with global emission reduction objectives. Figure 10 shows the type of reference level that will be needed to make new agreements compatible with global emission reduction goals. Over time all nations must take on a greater share of responsibility domestically and meet more ambitious goals to receive international financing at a rate that is consistent with their stage of development.

Recommendation: The United States should work to ensure that international agreements with tropical forest nations secure actions by those nations that support global emission reduction goals for forests. One way to make this requirement regarding the ambition of forest agreements more concrete would be to require nations to develop a reference scenario that reaches a sustainable level of carbon stocks within a certain timeframe after beginning to receive funding from U.S. programs. This requirement would channel U.S. funding to nations that are taking appropriate national action and thus create the strongest possible incentives for nations to develop ambitious emission reduction plans. This is the general approach taken in the House climate bill and suggested by the Administration in their submissions to global climate talks.

As one example, the House bill provides incentives for countries to adopt national deforestation baselines that require declining deforestation rates over time and

Figure 11: Sharing Responsibility for International Financing



Source: Climate Advisers analysis

reaching zero net deforestation within twenty years. This does not mean that all forest sector economic activity must cease, but that deforestation in one area must be balanced by re-growth or regeneration in another, as long as appropriate safeguards are in place to ensure that perverse incentives are not in place to encourage deforestation followed by crediting for re-growth. Payments would gradually decline over time, with developing nations adopting a greater share of the effort, and eventually taking on full responsibility for financing and managing sustainable levels of forests in their countries consistent with global climate goals (see Figure 11). While a limit could be useful to encourage more advanced developing nations to adopt commitments by signaling that payments will not be perpetual, the United States must be careful in implementing provisions of this type to ensure that it does not create reversals in reductions that have been achieved, especially in least-developed countries.

Yet, there is also a risk that overly ambitious reference scenarios could create disincentives for action and raise the cost of U.S. climate action. Making it too hard for developing nations to qualify for U.S. financial assistance would reduce their incentive for action and could result in significantly fewer emission reductions than under a more optimal scenario. In addition, overly ambitious reference levels for U.S. funding could result in low quantities of forest carbon offsets and thus higher compliance prices for U.S. firms participating in the cap-and-trade program. The key to success, therefore, will be making sure the reference scenarios set in international agreements are set based on the best available analysis and guided by climate science.

Appropriate and strong reference scenarios, however, are only one negotiating objective the United States must pursue. While much of this report has been framed around the question of how best to design U.S. climate legislation, the insights and recommendations offered in prior sections should also guide U.S. climate diplomacy relating to forests. The following principles endorsed previously in the context of cap-and-trade legislation

are also relevant for future climate agreements.

- Incentives are needed for reducing deforestation in nations that are experiencing high rates of deforestation and in those where low deforestation rates could rise absent outside support;
- Public and private funding mechanisms are needed;
- Only verified emission reductions should be included in private carbon markets;
- Public funding mechanisms should help nations build their capacity for action, implement policy and governance reforms, provide upfront funding and purchase verified emission reductions, particularly in high-risk, non-market countries that may be ignored by private investors;
- Credible protocols and common standards are needed to measure, monitor and verify emission reductions in tropical forests;
- Upfront funding is needed to help developing nations with early phases planning and implementation; and
- Forest provisions in an international climate agreement should be compatible with the future creation of a comprehensive system for managing all terrestrial carbon, including forests, agriculture, rangelands and other sources.

Finalizing international negotiations on tropical forest emissions will also require nations to resolve a number of highly technical methodological issues. The United States may need to align technical standards proposed by the State Department to international climate talks with those contained in climate legislation. In general, these issues are best resolved by the Executive Branch, drawing on the technical expertise that resides in relevant agencies, with timely input from relevant scientific advisory bodies. For purposes of implementing new domestic climate laws, Congress should ask the Executive Branch to promulgate new regulations and to consult with the National Academy of Science and other science advisers when developing these regulations and proposed methodologies in global climate negotiations.

Making U.S. Policies Work Efficiently

Recommendation: The pool of emission allowances set aside to help control the cost of a new cap-and-trade program (the "strategic reserve") should be large enough to manage the risk that the supply of forest carbon "offsets" may prove insufficient to stabilize prices and price spikes. While the United States should reduce the cost of climate action by partnering with developing nations to finance forest sector emission reductions, if the United States adopts a cap-and-trade program it must also guard against the possibility that U.S. demand for international forest carbon will exceed available supply.

A substantial amount of work lies ahead. Developing nations must transition through the three phases of action identified above — (1) planning, (2) implementation of forest sector policy and governance reforms and (3) verification of actual emission reductions. Few developing nations are far along in the planning process and most need substantial technical assistance to even get started. Not all developing nations have the political will and societal buy-in to implement needed forest sector policy reforms. And only a few developing nations today are close to having the capacity to reliably measure, monitor, and verify actual emission reductions.

Despite these challenges several credible studies predict that developing nations should prove capable of meeting U.S. and global needs for low-cost forest carbon offsets. The table below provides an initial estimate of forest carbon offset quantities in early years of a U.S. cap-and-trade program (see Table 2). While these quantities are significant, they nevertheless may fall short of the amounts needed to achieve U.S. cost containment and climate mitigation goals, depending on demand from other countries, highlighting the urgency of upfront funding. The U.S. leadership and financial and technical resources recommended in this report will be

Table 2: Current Estimates of Availability of Verifiable Emission Reductions from Forests (millions of tons of CO2)

Year	2013	2020
Top 9 Countries[127]	950	1,400
Rest of world	200	370

Source: Climate Advisers analysis, based on preliminary data provided by Boucher, D. (2009) and Resources for the Future (2009) *The Forest Carbon Index*, Washington, DC. (forthcoming report)

critical in bridging the gap between this current potential of verified reductions and the additional reductions needed to achieve the goal of reducing emissions from deforestation 50 percent by 2020.

The possibility of a gap between international supply and U.S. forest carbon demand is reason for concern. The road to access U.S. and global incentive programs may be a long and demanding journey for many developing nations. For some, this will require fundamental transformations in their forest-based economies and societies. If progress in reducing deforestation proves more difficult than expected, the shortfall between international offset supply and global offset demand could lead to substantially higher compliance costs for U.S. regulated companies under a domestic cap-and-trade program.

For both economic and environmental reasons, therefore, the United States needs a policy mechanism to guard against uncertainty in international forest carbon supply with global offset demand, thereby controlling costs and avoiding economically damaging price spikes.

The House climate bill includes one such mechanism—a "strategic reserve" of emission allowances. If allowance prices reach a certain threshold (initially $28 per ton but changing over time based on market prices), companies would be allowed to purchase at that price a limited amount of additional allowances from the government-managed strategic reserve. The emission allowances in the strategic reserve would be borrowed from current and future years of the cap-and-trade program. This means that emissions could rise in the short run, but companies overall would need to reduce a corresponding amount of emissions in later years to avoid undermining long-term emission reduction goals. Total U.S. emissions from 2012 and 2050 would not increase, they would be shifted forward slightly within that period. The EPA would use revenues from the sale of strategic-reserve tons to purchase verified emission reductions from tropical forests. Emission reductions purchased in this manner would refill the strategic reserve to allow for future sales to U.S. companies, assuming prices remain high.

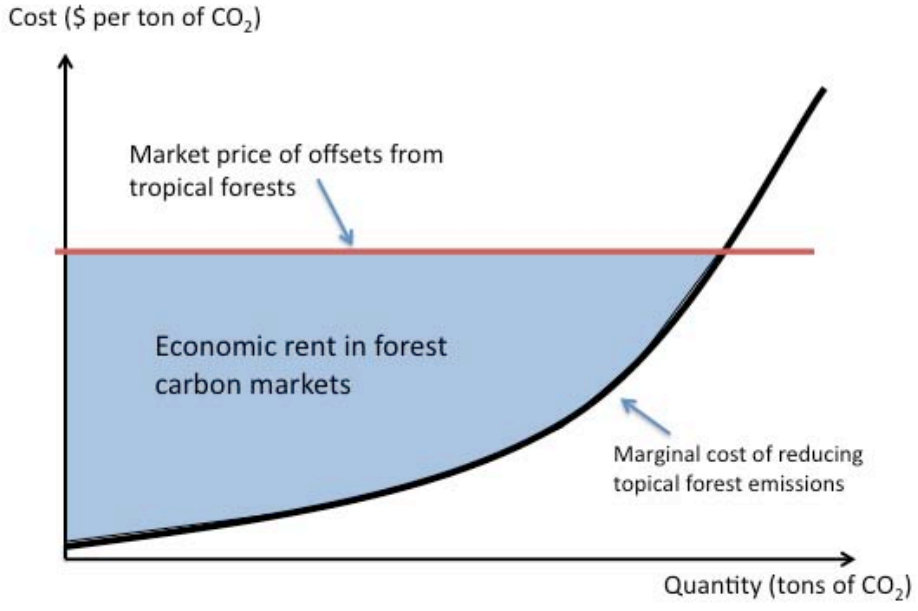
To be effective, the strategic reserve needs to be designed in a way that takes into account expected

and unexpected mismatches between domestic offset demand and international forest carbon offset supply. More specifically, the size of the strategic reserve needs to be large enough to account for the possibility that the supply of forest-carbon offsets will be insufficient to control costs, and thus demand for strategic reserve allowances could be larger than expected. Similarly, the strategic reserve needs to avoid relying too heavily on the notion that the United States will refill the strategic reserve with tropical forest emission reductions in case those forest carbon tons are not immediately available. More analysis is needed on the right role for tropical forest emission reductions in refilling the strategic reserve and to determine its optimum size.

While a mechanism to deal with gaps between tropical forest offset demand and supply is essential, it is not sufficient. The United States needs to work to avoid this gap rather than only dealing with it if and when it occurs. In other words, the best strategy would be for the United States to develop and fully fund programs to help developing nations quickly generate a stable supply of tropical forest offsets. This is why setting aside 5 percent of the allowance value of tradable emission allowances for new programs that build the capacity of developing nations to participate in U.S. carbon markets is so important. As this set-aside funding will not be available until a cap-and-trade program takes effect, foreign-assistance bridge financing in the range of $1 billion is needed from now until 2012. Together, these public funding programs would prime the pump for the forest carbon offset market and reduce the economic risks of climate policy for the United States.

Recommendation: The United States should explore and consider establishing a financial intermediary to aggregate forest carbon offset demand and supply. In order to further contain costs and maximize the environmental benefits of forest carbon offsets if the United States adopts a cap-and-trade program we should explore and consider establishing a financial intermediary to aggregate forest carbon offset demand and supply. U.S. corporations could continue to have the option of purchasing forest carbon offsets directly from developing country partners but could also purchase these offsets directly from a U.S. government entity. The carbon offset aggregator, therefore, would not become a bureaucratic impediment to U.S. companies accessing low-cost forest carbon

Figure 12: Economic Rent in Forest Carbon Markets [128]



Source: *Climate Advisers analysis*

offsets without government intermediation, but rather the aggregator would give companies an additional option with substantial potential benefits.

The rationale for a government offset aggregator is straightforward. Individual firms purchasing offsets have relatively limited market power compared to large forest carbon offset suppliers, such as Indonesia. In an efficient global carbon market, U.S. companies would pay relatively high market clearing or equilibrium prices. In many developing nations, however, the actual cost of reducing tropical forest emissions will be substantially lower than the market price. While developing nations should benefit substantially from avoiding deforestation, an un-intermediated forest carbon market would likely result in unnecessarily high costs for U.S. companies as well as windfall profits that could accrue to carbon speculators and/or credit suppliers. This corresponds to what economists call "economic rent" — the difference between market prices and production costs (see Figure 12 on page 61).

In contrast, a U.S. government offset aggregator making bulk purchases would have substantially more market power. Indeed, the U.S. carbon market is expected to be the largest in the world — so large that it may have some ability to drive down market prices. A U.S. government offset aggregator could use this purchasing power to negotiate favorable prices well below the un-intermediated market-clearing price. Given the billions of tons of offsets expected to enter the U.S. market, even a difference of a few dollars a ton would add up quickly. As the cost of reducing deforestation in some countries is expected to be relatively low, the cost savings for the United States could be substantial.

By allowing companies to buy forest carbon offsets from a U.S. government entity at lower-than-market prices, financial flows to developing nations could be kept at manageable levels. As noted above, the scale of expected forest carbon flows overseas has been a major concern in the Senate. Limiting income transfers to developing nations to the level necessary to achieve emission reductions and provide local benefits could improve the prospects for Senate support of strong tropical forest conservation measures. Lower offset prices also would reduce the overall compliance costs for the U.S. economy. Also, the government aggregator could be structured to sell offsets at a predetermined price. In this way, the offset aggregator could help minimize short-term harmful effects of price volatility and guard against market manipulation by speculators. For these economic reasons an aggregator could make winning Senate support for forest conservation programs significantly easier.

A government aggregator, furthermore, would have major environmental benefits. First, it could maximize the amount of emissions mitigation achieved for each dollar spent. To use a simple example, if the government price were half that of the market price and all companies chose to buy international forest carbon offsets through the aggregator rather than through direct purchases, U.S. private sector funding for international forest offsets would achieve double the emission reductions. Second, with an offset aggregator, the United States would be in a better position to ensure the environmental integrity of offsets entering the U.S. compliance market than with a purely private system. The American people would know that offsets entering U.S. markets through the forest carbon aggregator would meet rigorous U.S. quality-control standards.

Companies that purchase offsets through the government aggregator would receive another important benefit. For offsets purchased from the aggregator, the responsibility for ensuring that international offsets from tropical forests are genuine and were developed in ways that benefited local people, including indigenous communities, would fall on the U.S. government instead of private companies. As the government would resell aggregated offsets to the private sector without linking them to any particular country, region or project (i.e., all offsets from the aggregator would be fungible), U.S. companies would no longer be exposed to the reputation risks that may be associated with tropical forest sector investments about which they may have very little information.

Recommendation: The United States should establish a coordinating council and designate a lead office or agency to oversee tropical forest conservation programs. The success of U.S. international forest conservation programs may depend on whether the United States organizes itself appropriately to manage these complex, new multi-billion dollar efforts. Responsible agencies will need the authority and expertise to successfully carry out the following diverse functions.

Commissioner Perspective:
SAM ALLEN
President and Chief Executive Officer, Deere & Company

"A robust global economy is critical to expanding the agricultural output necessary to meet the increasing needs of a growing and increasingly affluent population. Projections indicate that food production must increase 50% by 2030 and double by 2050. This challenge must be met with a constrained resource base and in an environmentally sustainably manner. Governments of the world must ensure sound public policies that enhance our environment through reduced carbon emissions, particularly from major sources like tropical deforestation. Rational, market-based protections that control the cost of carbon reductions offer the best approach to enabling farmers around the world to meet the food production challenge in a sustainable manner. Halting destruction of tropical forests makes business sense both as a cost-containment measure and as a long-term investment in healthy cropland and forest economies."

Environmental regulator. Capacity and expertise are needed to verify that emission reductions from international forests are genuine and do not undermine the environmental integrity of a new U.S. cap-and-trade program or U.S.-led international forest conservation programs.

International negotiator. Leadership is needed for U.S. efforts to negotiate the international agreements that climate legislation will likely stipulate are required for participating in either U.S. carbon markets or new government-to-government forest conservation programs.

Provider of technical assistance. Experience and expertise are needed to provide developing nations with the forest sector technical assistance necessary to support effective tropical forest conservation programs.

Financial fiduciary. The ability is needed to manage funds generated by auctioning emission allowances to U.S. companies for future payment to developing nations under the terms of bilateral or regional agreements negotiated with the U.S. government.

Market aggregator. The capacity is needed to potentially act as an "aggregator" of international forest emission reductions for private sector offset purchasers.

Overall strategist. Decisions will need to be made about how the overall strategy of programs should be set and what criteria should be used when allocating funding.

No existing U.S. department or agency has the capacity, experience and expertise needed to fulfill all of these functions. The State Department and USAID lack experience with environmental markets but have experience negotiating climate agreements and providing technical assistance. EPA has that market regulation experience but lacks expertise in tropical forests, as well as sufficient knowledge of on-the-ground political, economic and social conditions in developing nations. It also lacks experience negotiating complex, legally binding international agreements with geopolitical ramifications. The U.S. Forest Service, part of the U.S. Department of Agriculture, understands forest management policies and practices, but not necessarily in developing countries. Only the U.S. Department of the Treasury (Treasury) has experience acting as a market

maker and financial fiduciary. Treasury, however, lacks experience with tropical forests, regulating tradable pollution allowances or negotiating international climate agreements. The National Oceanographic and Atmospheric Administration (NOAA), the National Aeronautics and Space Administration (NASA) and the U.S. Department of Interior (through the U.S. Geological Survey) all have relevant technical expertise but do not have the regulatory, diplomatic or international development experience to lead U.S. efforts alone. Many agencies have experience setting overall strategies but they would certainly make decisions based on different criteria and their core competence. To succeed, the United States must develop an integrated "whole of government" approach — tapping into the expertise and authorities in all relevant agencies. EPA should regulate forest carbon markets. USAID should administer regional and bilateral in-country assistance programs. The State Department should negotiate international forest emission reduction agreements with developing countries. Treasury should serve as the financial fiduciary and work with multilateral funding mechanisms within international financial institutions, including most notably the World Bank. The Treasury might also be home to the new market aggregator described above. Various technical agencies should play roles consistent with their mandates and capacities.

Principle: U.S. policies to reduce tropical deforestation which harness the expertise and authorities of many agencies and departments will be critical to the success of U.S. forest conservation programs.

However, there is the significant risk that by dividing responsibility across the government, implementation of key programs could occur in a haphazard, uncoordinated manner, with different agencies sometimes working at cross purposes and often without taking advantage of their respective strengths. Given the size, complexity and importance of the task, the U.S. government needs a single coordinating entity. The White House should establish a coordinating council, and designate and fully fund a lead office or agency to serve this coordinating function. A fully united effort that harnesses relevant expertise, capacity and authorities across the entire government is absolutely essential.

The House climate bill envisions a very different approach. It would delegate responsibility for implementing both forest carbon markets and the tropical forest set-aside program to EPA, albeit in consultation with USAID, the State Department, and other appropriate federal agencies.

EPA, and not the Treasury Department, is in charge of auctioning allowances and managing the funds from the 5 percent allowance set-aside. EPA is given primary responsibility for issuing international offset credits and for deciding both what specific land types (such as peatlands lands or wetlands) and what activities (reduced degradation in addition to deforestation) should be considered eligible for funding or offset crediting. EPA, in consultation with USAID, is responsible for promulgating regulations establishing standards that should be met in international agreements required by the bill. The bill does not specify which agency would lead international negotiations with other nations. The decision to give EPA these sweeping authorities was made initially by the Energy and Commerce Committee partly to keep future oversight responsibility with the Committee's jurisdiction and to avoid referrals to other committees during the legislative process.

While EPA has many strengths and has a central role to play in many aspects of the cap-and-trade program, delegating EPA as the single lead agency would stretch beyond its core areas of competence and create conflicts with other U.S. policy objectives, particularly concerning diplomacy and international development. Given the wide range of expertise needed, the most effective approach would bring the entire U.S. government to bear in solving the problem, supported by a centralized coordinating body.

A Comprehensive Approach to Land-use Emissions

Forests, food, biofuels and fiber production compete for a finite land area in developing nations. Tropical forest loss is driven by that competition as tropical forests are turned into farmlands and rangelands, or harvested for timber. While making broader policy recommendations about mitigating global emissions from agriculture and other land-use changes is outside the mandate of the Commission, it is essential for the President and Congress to be cognizant of how forest conservation incentives will affect other land uses and policy objectives, and vice versa.

Global demand for food is expected to double by 2050.[129] New forest conservation incentives, therefore, may need to be accompanied by equally large-scale efforts to increase yields on existing farmlands and to rehabilitate and restore productivity to degraded lands. Without further agricultural intensification, some parts of the world may experience heightened risks of hunger. Therefore, U.S. policies need to look at international land-use decisions comprehensively—balancing the need to feed the growing global population with the urgency of protecting forests.

There are also concerns that poorly designed biofuel policies could cause farmers to clear carbon-rich forests to plant new fuel crops, thereby increasing rather than reducing global emissions. The European Union has concluded that developed-country biofuel mandates have already accelerated tropical deforestation in Brazil, Malaysia and Indonesia. World Bank auditors have shown that their private sector arm, the International Finance Corporation's palm-oil lending program has led to deforestation in Southeast Asia.[130]

Recommendation: The United States should promote a global transition to full terrestrial greenhouse gas emission accounting. Reducing emissions from deforestation ultimately will require the world to meet competing land-use demands as efficiently as possible. Only a comprehensive approach—one that looks at changes in carbon stocks and flows in forests, rangelands, agriculture and all other major land-use categories—would capture how changes in one land-use affect emissions in another, correct for perverse incentives and encourage maximum emissions mitigation. Few countries are prepared to adopt comprehensive accounting now. Many nations lack the capacity to measure, monitor and verify their emissions in land-based sectors. The Obama Administration has proposed setting comprehensive terrestrial accounting as a global goal, but the U.S. proposal has attracted limited support on this point in global climate talks.

For now, the best way to begin the transition to comprehensive terrestrial carbon management is to focus on improving procedures for measuring, monitoring, and verifying carbon storage and emissions across all land-use types. This includes studying the impact of forest conservation policies on other commodities, as well as the impacts of agriculture and biofuels on forest conservation efforts. The United States should promote improved global capacity to analyze climate interactions among land-use policies and experiment with more comprehensive approaches. The challenges associated with these tasks should not be used as justification for inaction or delay in reducing tropical forest emissions quickly now. Many existing technologies are impressive and need to be deployed and adopted far more broadly. U.S. investments in satellites and remote sensing, for example, should account for those needs, and findings should be declassified as appropriate and made widely available. Early international efforts should focus on improving procedures for measuring, monitoring and verifying greenhouse gases across all land-use types, including in greenhouse gas rich peatlands lands and other soils. The challenges associated with these tasks should not be used as justification for inaction or delay in reducing tropical forest emissions quickly now.

Finding: Without careful attention, U.S. forest conservation policies could work against its international agriculture and biofuels policies, and vice versa.

Another strategy, endorsed previously in this report, could be to create extra financial incentives for activities that conserve high-value primary forests or reforest marginal lands not suitable for agriculture. Giving preference to these activities would discourage conversion of forests to agriculture and promote reforestation without harming

food security. Finally, the United States could increase funding for agricultural foreign assistance programs. A new “green revolution” in developing nations would reduce pressure on forests, increase food security and help developing nations adapt to climate change.

Included in the House climate bill is a directive for the National Academy of Sciences to study methodologies for accounting for indirect land-use emissions and report back to EPA and the Department of Agriculture, which must include these emissions in their biofuel policies after six years. [131] This provision was a final sticking point in the House debate and is also likely to be a point of contention in the Senate. Leading experts have also raised concerns that standard carbon accounting methodologies may underestimate emissions from biofuels. [132] More analysis and policy making on this issue is needed.

Selected Bibliography

Barker, T. et al. (2007) *Technical Summary* in *Climate Change 2007: Mitigation. Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [B. Metz, O. R. Davidson, P. R. Bosch, R. Dave, L. A. Meyer (eds.)], Cambridge, United Kingdom and New York, NY, USA, Cambridge University Press.

Canadell, J.G. et al. (2007) *Contributions to accelerating atmospheric CO2 growth from economic activity, carbon intensity, and efficiency of natural sinks*, Proceedings of the National Academy of Sciences of the United States of America, vol. 104, no. 47, p. 18866-18870.

Congressional Budget Office (2009) *Cost Estimate H.R. 2454 American Clean Energy and Security Act of 2009*, Washington, DC.

DeFries, R.S., Houghton, R.A., et al. (2002) *Carbon emissions from tropical deforestation and regrowth based on satellite observations for the 1980s and 1990s*, Proceedings of the National Academy of Sciences of the United States of America, vol. 99, no. 22, p. 14256-14261.

Eliasch, J. (2008) *Climate Change: Financing Global Forests,* United Kingdom, Office of Climate Change.

Kindermann, G., Obersteiner, M. et al. (2008) *Global cost estimates of reducing carbon emissions through avoided deforestation,* Proceedings of the National Academy of Sciences of the United States of America, vol. 105, no. 30, p. 10302-10307.

Meridian Institute (2009) *Reducing Emissions from Deforestation and Forest Degradation (REDD): An Options Assessment Report*, Prepared for the Government of Norway by Arild Angelsen, Sandra Brown, Cyril Loisel, Leo Peskett, Charlotte Streck, and Daniel Zarin.

Nabuurs, G.J. et al. (2007) *Forestry*, in *Climate Change 2007: Mitigation. Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [B. Metz, O.R. Davidson, P.R. Bosch, R. Dave, L.A. Meyer (eds.)], Cambridge, United Kingdom and New York, NY, USA, Cambridge University Press.

Olander, L., Boyd, W., et al. (2009) *A Primer on International Forest Carbon,* North Carolina, USA, Duke University Nicholas Institute for Environmental Policy Solutions.

Parker, C., Mitchell, A., Trivedi, M. and Mardas, N. (2008) *The Little REDD Book,* Oxford, UK, Global Canopy Programme.

Project Catalyst (2009) *Towards the inclusion of forest-based mitigation in a global climate agreement*, San Francisco, CA, ClimateWorks Foundation.

Resources for the Future (2009) *The Forest Carbon Index*, Washington, DC. (forthcoming report).

United States Environmental Protection Agency (2009) *EPA Analysis of the American Clean Energy and Security Act of 2009*, Washington, DC.

Footnotes

[1] U.S. Global Change Research Program (2009) *Climate Change Impacts in the United States*, New York, NY, Cambridge University Press.
[2] Center for Naval Analysis (2007) *National Security and the Threat of Climate Change*, Washington, DC.
[3] Intergovernmental Panel on Climate Change (2007) *Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth As sessment Report of the Intergovernmental Panel on Climate Change* [Core Writing Team, Pachauri, R.K and Reisinger, A. (eds.)]. Geneva, Switzerland.
[4] International Energy Agency (2008) *World Energy Outlook*, Paris, France.
[5] Major Economies Forum on Energy and Climate (2009) *Declaration of the Leaders,* L'Aquila, Italy. http://www.whitehouse.gov/the_press_office/Declaration-of-the-Leaders-the-Major-Economies-Forum-on-Energy-and-Climate/G8 Summit (2009) *Responsible Leadership for a Sustainable Future,* L'Aquila, Italy. http://www.g8italia2009.it/static/G8_Allegato/G8_Declaration_08_07_09_final,0.pdf
[6] Project Catalyst (2009a) *Limiting atmospheric CO2e to 450 ppm – the mitigation challenge*, San Francisco, CA, ClimateWorks Foundation.
[7] Project Catalyst (2009b) *Towards the inclusion of forest-based mitigation in a global climate agreement,* San Francisco, CA, ClimateWorks Foundation.
Canadell, J.G., Le Quere, C., Raupach, M.R., Field, C.B., Buitenhuis, E.T., Ciais, P., Conway, T.J., Gillett, N.P., Houghton, R.A. and Marland, G. (2007) *Contributions to accelerating atmospheric CO2 growth from economic activity, carbon intensity, and efficiency of natural sinks*, Proceedings of the National Academy of Sciences of the United States of America, vol. 104, no. 47, p. 18866-18870. Nabuurs, G.J., Masera, O., Andrasko, K., Benitez-Ponce, P., Boer, R., Dutschke, M., Elsiddig, E., Ford-Robertson, J., Frumhoff, P., Karjalainen, T., Krankina, O., Kurz, W.A., Matsumoto, M., Oyhantcabal, W., Ravindranath, N.H., Sanz Sanchez, M.J. and Zhang, X. (2007) *Forestry*, In *Climate Change 2007: Mitigation. Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [B. Metz, O.R. Davidson, P.R. Bosch, R. Dave, L.A. Meyer (eds)], Cambridge, United Kingdom and New York, NY, USA, Cambridge University Press.
[8] Barker T., Bashmakov, I., Bernstein, L., Bogner, J.E., Bosch, P.R., Dave, R., Davidson, O.R., Fisher, B.S., Gupta, S., Halsnæs, K.,Heij, G.J., Kahn Ribeiro, S., Kobayashi, S., Levine, M.D., Martino, D.L., Masera, O., Metz, B., Meyer, L.A., Nabuurs, G.-J., Najam, A., Nakicenovic, N., Rogner, H.-H., Roy, J., Sathaye, J., Schock, R., Shukla, P., Sims, R.E.H., Smith, P., Tirpak, D.A, Urge-Vorsatz, D.
And Zhou, D. (2007) Technical Summary. In: *Climate Change 2007: Mitigation. Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [B. Metz, O. R. Davidson, P. R. Bosch, R. Dave, L. A. Meyer (eds)], Cambridge, United Kingdom and New York, NY, USA, Cambridge University Press. p. 27
[9] A recent working paper from the World Resources Institute (WRI) suggested that the percentage of emissions from deforestation could be as low as 12%. This is based on a revised estimate of emissions from deforestation, and an increase in fossil fuel emissions. See, Herzog, T. (2009) *World Greenhouse Gas Emissions in 2005*, Washington, DC, World Resources Institute, citing Houghhton, R.A. (2008) *Carbon Flux to the Atmosphere from Land-Use Changes: 1850-2005.* In *TRENDS: A Compendium of Data on Global Change. Carbon Dioxide Information Analysis Center*, Oak Ridge, Tenn., U.S.A., Oak Ridge National Laboratory, U.S. Department of Energy.
[10] Project Catalyst (2009a) (emission reductions at less than $85 per ton).
[11] Climate Advisers analysis, based on United States Environmental Protection Agency (2009a) *EPA Analysis of the American Clean Energy and Security Act of 2009*, Washington, DC. Calculated by comparing the overall abatement costs of IGEM model scenarios analyzed by EPA with and without international offsets.
[12] United States Environmental Protection Agency (2009b) *EPA Analysis of the American Clean Energy and Security Act of 2009*, *Data Annex,* Washington, DC.
[13] Project Catalyst, based on McKinsey and Company (2009a) *Pathways to a Low-Carbon Economy: Version 2 of the Global Greenhouse Gas Abatement Cost Curve*.
[14] The term "low-carbon economy" or "low-carbon growth" has traditionally referred to the process of "de-coupling" economic growth from growth of greenhouse gas emissions, particularly in the energy and manufacturing sectors. While the link has been lessened in many developed countries, major technological advancements and widespread deployment throughout the world will be necessary before this can fully be achieved. Forest conservation payments are essentially an effort to de-couple deforestation and economic growth in tropical forest nations, making them a key part of the low-carbon economy in many nations, and one that may be more viable in the short-term since it does not require technological breakthroughs.
[15] Food and Agriculture Organization of the United Nations (2006) *Global Forest Resources Assessment 2005. Progress towards sustainable forest management*, Rome, Italy.
DeFries, R.S., Houghton, R.A., Hansen, M.C., Field, C.B., Skole, D. and Townshend, J. (2002) *Carbon emissions from tropical deforestation and regrowth based on satellite observations for the 1980s and 1990s*. United States, Proceedings of the National Academy of Sciences, Vol. 99, no. 22, p. 14256–14261.
[16] Eliasch, J. (2008) *Climate Change: Financing Global Forests*, United Kingdom, Office of Climate Change.
[17] Project Catalyst (2009a) p. 9-10
[18] Kauppi, P.E., Ausubel, J.H., Fang, J., Mather, A., Sedjo, R.A. and Waggoner, P.E. (2006) *Returning Forest analyzed with the forest identity,* USA, Proceedings of the National Academy of Sciences, Vol. 103, no. 46, p. 17574-17579
[19] Project Catalyst (2009a) p. 9
[20] Soliani, A. (2008) *Brazil to Slash Amazon Deforestation More Than Half*, New York, NY, Bloomberg. http://www.bloomberg.com/apps/news?pid=20601086&sid=aWQ7KaCrd5HE&refer=latin_america
[21] Chomitz, K. (2006) *At Loggerheads? Agricultural Expansion, Poverty Reduction, and Environment in the Tropical Forests,* Washington, DC, The World Bank. p. 183-4
[22] Eliasch, J. (2008) p. 87
[23] Fonseca, G. A. B. d., Rodriguez, C. M., Midgley, G., Busch, J., Hannah, L., et al. (2007) *No forest left behind*, PLoS Biology 5(8): e216.
[24] Angelsen, A. (ed.) (2008) *Moving ahead with REDD: Issues, options and implications*, Bogor, Indonesia, CIFOR. p. 44
[25] Government of Brazil (2007a) *National Plan on Climate Change, Executive Summary,* Brazil.
Although the original goal in Brazil's National Plan on Climate Change amounts to about a 70% reduction in deforestation rates by 2017, they have since extended the goal to an 80% reduction by 2020, compared to the average rate from 1996-2005.
[26] Unless stated otherwise, whenever the terms "reduced emissions" or "forest conservation" are used in this paper, they are meant to refer to both reductions in deforestation or forest degradation rates, and enhancement of carbon stocks.
[27] Project Catalyst (2009b) p. 9-10.
[28] Project Catalyst (2009b) p. 8
[29] Resources for the Future (2009) *The Forest Carbon Index*, Washington, DC.
[30] McKinsey and Company (2009b) *Fact Sheet: Indonesia Greenhouse Gas Emission Cost Curve*, Indonesia.
Resources for the Future (2009).
[31] Rosenthal, E. (2009) *In Brazil, Paying Farmers to Let the Trees Stand*, New York, NY, The New York Times, 21 August. http://www.nytimes.com/2009/08/22/science/earth/22degrees.html?ref=science.
[32] World Resources Institute (2009) *Climate Analysis Indicators Tool (CAIT) Version 6.0,* Washington, DC. Based on data from 2000, the last year

comprehensive country-level data on emissions from land-use are available.
[33] Government of Brazil (2007a)
Azevedo, T. (2009) unpublished presentation.
[34] While the Brazilian Amazon Fund uses a conservative estimate of 100 tons of carbon per hectare to estimate emissions from deforestation, recent studies indicate that a more accurate number should be closer to 180 tons per hectare when assessing mitigation potential. This report uses the more recent figure from a study by Loarie et al. (2009), which accounts for any discrepancy between its results and official Brazilian government figures.
Loarie, S.R., Asner, G.P., and Field, C.B. (2009) *Boosted carbon emissions from Amazon deforestation,* Geophysical Research Letters, VOL. 36, L14810.
[35] McKinsey and Company (2009c) *Pathways to a Low-carbon Economy for Brazil*, Brazil.
[36] Exman, F., da Costa, A.N. and Zargham, M. (2008) *Norway pledges $1 billion to Brazil Amazon Fund*, Reuters, 17 Sept. http://uk.reuters.com/article/idUKN1649421720080916
[37] Azevedo, T. (2009).
[38] Exman, F., da Costa, A.N. and Zargham, M. (2008).
[39] McKinsey and Company (2009b).
[40] McKinsey and Company (2009b).
[41] Resources for the Future (2009).
[42] Simamora, A. (2009a) *Indonesia needs $4b to avert deforestation*, Indonesia, The Jakarta Post. http://www.thejakartapost.com/news/2009/06/03/indonesia-needs-4b-avert-deforestation.html
Simamora, A. (2009b) *Illegal logging sharply declines in Indonesia: Minister*, Indonesia, The Jakarta Post. http://www.thejakartapost.com/news/2009/05/28/illegal-logging-sharply-declines-indonesia-minister.html
[43] Butler, R. (2009b) *Indonesia,* Mongabay.com. http://rainforests.mongabay.com/20indonesia.htm
[44] Barr, C. (2000) *Profits on Paper: the Political Economy of Fiber, Finance and Debt in Indonesia's Pulp and Paper Industrie*s, Indonesia, CIFOR.
Pulp Mill Watch (2009) *Indonesia*. http://www.pulpmillwatch.org/countries/indonesia/
[45] Simamora, A. (2009a).
[46] Butler, R. (2009c) *Indonesia releases revenue sharing rules for REDD forest carbon projects*, Mongabay.com.
[47] Friedman, L. (2009) *How the World Bank Let 'Deal Making' Torch the Rainforests*, The New York Times, 19 Aug. http://www.nytimes.com/cwire/2009/08/19/19climatewire-how-the-world-bank-let-deal-making-torch-the-33255.html
[48] The Nature Conservancy (2009) personal communication.
[49] United States Agency for International Development (2009) *Congo Basin Forest Partnership*, Washington, DC.
[50] United States Agency for International Development (2008) *USAID's Biodiversity Conservation and Forestry Programs, FY 2007,* Washington, DC. p. vi.
[51] Borger, J. (2008) *Biggest ever forest protection fund targets Congo basin,* United Kingdom, The Guardian. http://www.guardian.co.uk/environment/2008/jun/17/forests.endangeredhabitats
[52] Butler, R. (2009e) *Deforestation in the Congo*. Mongabay.com. http://rainforests.mongabay.com/congo/deforestation.html.
[53] Resources for the Future (2009).
[54] Resources for the Future (2009).
[55] National Intelligence Council (2008) *Global Trends 2025: A Transformed World*, Washington, DC.
[56] Busby, J. (2007) *Climate Change and National Security: An Agenda for Action*, New York, NY, Council on Foreign Relations. p. 28
[57] Kaimowitz, D. (2005) *Forests and war, forests and peace*, in Food and Agriculture Organization of the United Nations (2005) *State of the World's Forests*. p. 116-123.
[58] Center for Naval Analysis (2007) *National Security and the Threat of Climate Change*, Washington, DC.
[59] Warner, J. (2009) *Testimony by Senator John Warner (Retired)*, Washington, DC, Senate Foreign Relations Committee, 21 July. http://foreign.senate.gov/testimony/2009/WarnerTestimony090721p.pdf
[60] National Intelligence Council (2008).
[61] Purvis, N., Jones, A. and Brainerd, L. (2009) *Climate Change and Global Poverty: A Billion Lives in the Balance*, Washington, DC, Brookings Institution Press.
[62] The World Bank (2004) *Sustaining Forests: A Development Strategy,* Washington, DC, The World Bank. The World Bank (2005) *Climate Change Threatens Wealth Creation in Developing Countries*, Washington, DC. http://web.worldbank.org/WBSITE/EXTERNAL/NEWS/0,,contentMDK:20746661~pagePK:34370~piPK:34424~theSitePK:4607,00.html
Chomitz, K. (2006).
[63] Olander, L., Boyd, W., Lawlor, K., Myers, E.M. and Niles, J.O. (2009) *A Primer on International Forest Carbon,* North Carolina, USA, Duke University Nicholas Institute for Environmental Policy Solutions. p. 2-5., Chomitz, K. (2006)
[64] Olander, L. et al. (2009) p. 25. The World Bank. (2004).
[65] Reid, W. and Miller, K. R. (1989) *Keeping Options Alive: The scientific basis for the conservation of biodiversity*, Washington, DC, World Resources Institute. http://www.wri.org/publication/content/8190
[66] The World Bank (2006) *Where is the Wealth of Nations? Measuring Capital for the 21st Century*, Washington, DC.
[67] Millennium Ecosystem Assessment (2005) *Ecosystems and Human Well-Being, Synthesis,* Washington, DC, Island Press. http://www.millenniumassessment.org/documents/document.356.aspx.pdf
[68] Meridian Institute (2009) *Reducing Emissions from Deforestation and Forest Degradation (REDD): An Options Assessment Report*, prepared for the Government of Norway by Arild Angelsen, Sandra Brown, Cyril Loisel, Leo Peskett, Charlotte Streck, and Daniel Zarin. p. 3 http://www.REDD-OAR.org
[69] Eliasch, J. (2008) p. 70, 76, 162.
Stern, N. (2006) *The Stern Review on the Economics of Climate Change*, United Kingdom, Office of Climate Change. p. 217.
Grieg-Gran, M. (2008) *The Cost of Avoiding Deforestation,* London, UK, International Institute for Environment and Development.
[70] Early-year estimates of global needs are derived from Meridian Institute (2009), and consistent with ongoing discussions in the Informal Working Group on Interim Finance for REDD, a group of developing and developed countries working to advance discussions on reducing deforestation in support of global climate negotiations. The $30 billion estimate for 2020 is the cost of reducing 3 billion tons of emissions from deforestation at an average cost of $10 per ton. This estimate is derived from a variety of global analyses and economic models reviewed for the Commission's report. Most models estimate a total cost of reducing deforestation by half between $17-33 billion per year in the 2030-2035 timeframe, at a price of $5-$20 per ton of carbon dioxide. Since the Commission is recommending emissions from deforestation be reduced by half faster than anticipated by most of these models and based on the on-the-ground project experience of some Commission members, it has chosen an estimate towards the high end of these ranges. Indeed, the on-the-ground project costs of some organizations suggest that costs may be higher. The average cost of $10 per ton was chosen as a mid-range estimate within the ranges projected by these models. The actual price paid per ton and overall global cost will differ based on a variety of factors, but the Commission believes this estimate is based on the best available data and backed by enough confidence to serve as a strong objective for the international community to reach in terms of overall financing.
[71] Meridian Institute (2009) p. 51-3.
[72] Eliasch, J. (2008) p. 223-226.

[73] Eliasch, J. (2008) p. 224.
[74] The World Bank (2008) *State and Trends of the Carbon Market 2008*, Washington, DC.
[75] U.S Census Bureau (2009) *Foreign Trade Statistics*, Washington, DC.
[76] Resources for the Future (2009).
[77] Hermosilla, A. C. and Simula, M. (2007) *The World Bank Forest Strategy: Review of Implementation*, Washington, DC, The World Bank. p. 13-14.
[78] G8 (2002) *G8 Action Program on Forests – Final Report.* http://www.illegal-logging.info/item_single.php?item=document&item_id=38&approach_id=2
[79] Tropical Forest Group (2007) *A History of Climate Change and Tropical Forest Negotiations*. http://www.tropicalforestgroup.org/articles/printable/REDD_history.pdf
[80] The group is known as the "Informal Working Group on Interim Finance for REDD". It was referenced in the 2009 G8 Leaders' statement *Responsible Leadership for a Sustainable Future* found here: http://www.g8italia2009.it/static/G8_Allegato/G8_Declaration_08_07_09_final,0.pdf
[81] United States (2009).
[82] Parker, C., Mitchell, A., Trivedi, M. and Mardas, N. (2008) *The Little REDD Book,* Oxford, UK, Global Canopy Programme.
[83] Parker, C. et al. (2008) p. 68-70. Brazil's national plan also proposes reforestation and afforestation objectives, but their submissions to the international community has focused on reducing emissions from a reference rate of deforestation.
Government of Brazil (2007a).
Government of Brazil (2007b) *Brazilian Perspective on Reducing Emissions from Deforestation,* submission to the Subsidiary Body for Scientific and Technological Advice, Twenty-sixth session, Bonn, Germany, UNFCCC, 8-17 May. p. 21-24 http://unfccc.int/resource/docs/2007/sbsta/eng/misc02.pdf
[84] Olander, L. et al. (2009) p. 22-25.
[85] Angelsen, A. (ed.) (2008).
[86] Olander, L. et al. (2009) p. 19-21.
[87] UNFCCC (2007) *Bali Action Plan,* Bali, Indonesia. http://unfccc.int/files/meetings/cop_13/application/pdf/cp_bali_action.pdf
[88] Angelsen, A. (ed.) (2008).
[89] Angelsen, A. (ed.) (2008) p. 125.
[90] U.S. Department of the Treasury (2008) *Debt-for-Nature Agreement to Conserve Peru's Tropical Forests*, Washington, DC, 21 Oct. http://www.ustreas.gov/press/releases/hp1226.htm
[91] United States Agency for International Development (2008) p. vi.
[92] United States Department of the Treasury (2009) *Treasury International Programs,* Washington, DC. http://www.treas.gov/offices/management/budget/budgetinbrief/fy2010/BIB-InternationalPrograms.pdf
The United States has contributed $80-100 million per year over the last several years to the GEF, which devotes about a third of its resources to forest and biodiversity-related projects.
[93] United States Customs and Border Protection (2009) *Guidance on the Lacey Act Declaration*, Washington, DC. http://www.cbp.gov/xp/cgov/trade/trade_programs/entry_summary/laws/food_energy/amended_lacey_act/guidance_lacey_act.xml
[94] United States Agency for International Development (2008) p. 100-101.
This figure includes funding through USAID, the Treasury Department, and contributions to the World Bank's Global Environment Facility that were directed at forest conservation.
[95] See footnote 73.
[96] George W. Bush (2007) *Toward A New Global Approach To Climate Change And Energy Security*, Washington, DC. http://2001-2009.state.gov/g/oes/rls/fs/2007/92935.htm
[97] Energy Policy Act of 2005, Public Law 109–58—AUG. 8, 2005. www.epa.gov/oust/fedlaws/publ_109-058.pdf
[98] World Resources Institute (2009).
[99] This number is derived from the EPA analysis of the House bill using their IGEM model. It assumes that 56% of international offsets will come from reducing emissions from tropical deforestation, as suggested by models EPA uses, and that the 720 million tons of reductions mandated for set-aside funding will be achieved. If the percentage of international offsets from forests were as high as 80%, as suggested by some models, this number could be over 50%. It could also be as low as 35%, if the legally mandated 720 million tons are not achieved. Therefore, the analysis in this report makes two key assumptions: 1) the pool of verified emission reductions from forests will be large enough and cost-effective enough to satisfy U.S. offset and set-aside demand, and 2) there will be enough money from the set-aside to purchase 720 million tons of verified emission reductions in 2020. These assumptions introduce some inconsistency into the analysis, but the alternative would be to assume that the law would be violated. Indeed, the House bill includes a provision that requires the EPA Administrator to increase the set-aside for tropical forests if there is not enough funding to achieve mandated reductions. If the world is able to reduce tropical deforestation 50% by 2020, as called for in this report, the first assumption will be less problematic.
[100] U.S. EPA (2009a).
Congressional Budget Office (2009) *Cost Estimate H.R. 2454 American Clean Energy and Security Act of 2009*, Washington, DC.
[101] This recommendation is the sum of two components. First is the cost of international offsets that would need to be purchased by the private sector in order to effectively contain the costs of a cap-and-trade program, according to U.S. government analyses. The second is the amount of funding the United States would need in order to provide upfront funding and to engage high-risk countries, countries that are unwilling to participate in markets and countries with large forest stocks but historically low rates of deforestation. The second component assumed a U.S. contribution in each of these areas of 20-25% of the amount needed to achieve a halving of deforestation by 2020, which is the minimum amount the United States would need to provide in order to catalyze a global effort.
[102] The bill also includes a third potential provision for financing tropical forest conservation. If allowance prices rise above a certain level, additional ones will be auctioned from a "strategic reserve," filled each year with a pre-determined amount. Once the reserve has been exhausted, it is refilled by purchasing verified emissions reductions from international forest conservation. Given that most estimates place the cost of allowances well below the price required to trigger the strategic reserve, is it unlikely that any additional funding for forest conservation will be generated in this way.
[103] However, some analyses such as that conducted by the EPA assume that not enough funding will be available to achieve the full 720 million tons of reductions. In addition, depending on the amount of credits "banked" in a given year, this number could be lower or higher than the mandate when taking a one-year snapshot of reductions.
[104] See footnote 99, because this is based on EPA analysis the set-aside is not assumed to be legally binding.
[105] United States of America (2009) *United States Input to the Negotiating Text for Consideration at the 6th Session of the AWG-LCA*, Washington, DC. p. 20-21. http://unfccc.int/files/kyoto_protocol/application/pdf/usa040509.pdf
[106] See footnote 105.
[107] All values are in millions of 2009 U.S. dollars based on allowance prices and international offset volumes estimated by the U.S. EPA's ADAGE and IGEM model analysis and the Congressional Budget Office.
[108] The EPA Administrator is required by H.R. 2454 to increase the allowance set-aside for supplemental reductions from international forest conservation if necessary to ensure the purchase 720 million tons of verified emissions reductions each year from 2020-2025, and a total of 6,000 million tons from 2012-2025.
[109] U.S. EPA (2009a).

[110] This calculation is based on the range of offset volumes in the preceding sentence that are purchased at the 2020 allowance prices estimated by each study. Since international offsets are discounted at a ratio of 1.25:1 beginning in 2017, the amount of offsets purchased will be larger than the amount used for compliance at a 1.25:1 ratio.
[111] See Congressional Record for June 2-6, 2008, remarks by Senator Corker, Senator Cochran, Senator Enzi, and Senator Craig.
[112] Leonard, L., Kopp, R.J. and Purvis, N. (2009) *International Forest Carbon in Congress: A Survey of Key Congressional Staff*, Washington, DC, Resources for the Future. http://www.rff.org/RFF/Documents/RFF-IB-09-03.pdf
[113] United States Climate Action Partnership (2009) *A Blueprint for Legislative Action*, Washington, DC. p. 10-12 http://ww.us-cap.org/pdf/USCAP_Blueprint.pdf, Avoided Deforestation Partners (2009) *Tropical Forest and Climate Coalition.* http://adpartners.org/pdf/ADP%20Forest-Climate%20Unity%20Agreement-%205-18-09.pdf
[114] For further details, see: http://www.climatechange.ca.gov/forestry_task_force/index.html
[115] Grieg-Gran, M. (2008).
[116] This figure is an estimate based on the compensation (at $10 per ton of CO_2) needed to prevent the equivalent of a doubling in emissions from deforestation in the Congo Basin by 2020, a region that has been identified as a site of potential "leakage" caused by emission reductions in other areas.
[117] This figure is an estimate based on the compensation (at $10 per ton of CO_2) needed to reduce emissions from high-risk countries in an amount equivalent to current emissions from the Congo Basin region by 2020.
[118] This figure is an estimate based on the compensation (at $10 per ton of CO_2) needed to reduce emissions from Brazil and other non-market countries by about 1.25 billion tons per year by 2020, in line with earlier country-specific discussions in this paper, with the United States financing approximately one fourth of these reductions. Although Brazil's Amazon Fund has requested "ex-post" payments of $5 per ton of emissions reduced, on-the-ground project experience, economic models and potential increased pressure on forests as reductions are achieved suggests that the price of emission reductions may be closer to $10 per ton.
[119] This figure is consistent with a private sector investment in 900 million tons of emission reductions at a price of $10 per ton (or 600 million tons of emission reductions at a price of $15 per ton). Nine hundred million is approximately 60% of the 1.5 billion tons of international offsets that have been recommended by some stakeholders and are included in the House bill, consistent with EPA estimates that roughly this share of total international offsets would come from forests. This figure is also close to the midpoint between the total amount spent to purchase offsets in the EPA (seen as a high estimate) and Congressional Budget Office (seen as a low estimate) analyses of the House bill. Both analyses show relatively low costs for U.S. companies and consumers, and in the context of a cap-and-trade program the Commission believes at least this amount of international offset purchases will be needed to contain costs. Since the CBO cost curves were not readily available, Commission staff estimated that 56% of total offsets would come from forests. This 56% figure is drawn from the international abatement cost curves used by EPA. Under these analyses, this would equal about 400-500 million tons of verified offset tons purchased by U.S. companies in 2020 from tropical forests, depending on allowance prices, in addition to about 500 million tons purchased through public funding. Assuming U.S. public funding contributions are leveraged in the manner envisioned in the previous section, with the U.S. financing about 25% of the global total (about 1.75-2.25 billion tons of emission reductions, depending on if credit is provided for reductions from high-forest, low-deforestation countries), this means an additional 250-850 million tons of reductions would need to be achieved in order to halve global deforestation. These could be additional offset purchases by the United States or other countries. It is also possible that some of the public funding purchases envisioned in this analysis are instead purchased as verified reductions through carbon markets in the United States or elsewhere, shifting the balance of funding between public and private but still requiring the same overall need. The estimate of saving "up to 50%" and "up to $50 billion" is calculated by the difference between the costs of EPA scenarios with and without international offsets. Although not all of these savings would come from forests, based on EPA and other cost curves it is likely that roughly 60% of international offsets could come from forests, making them a critical part of the cost savings achieved by the bill.
[120] For example, see the Amazon Alliance, http://www.amazonalliance.org/en/ and Tebtebba, http://www.tebtebba.org/
[121] H.R. 2454, The American Clean Energy and Security Act of 2009, passed by the House of Representative on June 26, 2009.
[122] H.R. 2454.
[123] Ecosystem Marketplace (2009) *Forest Carbon Portal*. http://www.forestcarbonportal.com/index.php
[124] Voluntary Carbon Standard (2009) *Agriculture, Forestry, & Other Land Use.* http://www.v-c-s.org/afl.html
Climate, Community, and Biodiversity Alliance (2009) *CCB Standards.* http://www.climate-standards.org/
United Nations Framework Convention on Climate Change (2009) *Methodologies for afforestation and reforestation CDM project activities*. http://cdm.unfccc.int/methodologies/ARmethodologies/index.html
[125] The Nature Conservancy (2009) *INTEGRATED INCENTIVES: A comprehensive REDD+ framework for achieving sufficient, credible, and equitable forest carbon benefits*, Washington, DC.
[126] Wagner, R.G. et al. (2006) *The Role of Vegetation Management for Enhancing Productivity of the World's Forests*, 79 Forestry 57.
Nabuurs, G.J. et al. (2007) *Forestry*, in Metz, B. et al. (eds.) (2007) *Mitigation*, Intergovernmental Panel on Climate Change. p. 576.
Jackson, R.B. et al. (2005), *Trading Water for Carbon with Biological Carbon Sequestration*, 310 Science 1944.
Carrasco-Letellier, L. et al. (2004) *Preliminary Study of Prairies Forested with Eucalyptus Sp. at the Northwest Uruguayan Soils*, 127 Envtl. Pollution 59.
[127] Includes Indonesia, Brazil, Malaysia, Myanmar, the Democratic Republic of the Congo, Zambia, Nigeria, Peru and Papua New Guinea.
[128] This figure is intended to be generally illustrative of the benefits of a forest carbon aggregator, but global forest carbon markets are likely to be much more complicated. It ignores the consumer surplus offset purchasers are likely to gain from purchasing tropical forest offsets at a price lower than other alternatives.
[129] Food and Agriculture Organization of the United Nations (2006) *World agriculture: towards 2030/2050, Interim Report,* Rome, Italy.
[130] Friedman, L. (2009).
[131] H.R. 2454.
[132] Wise, M., Calvin, K., Thomson, A., Clarke, L., Bond-Lamberty, B., Sands, R., Smith, S.J., Janetos, A., and Edmonds, J. (2008) *Implications of Limiting CO2 Concentrations for Land Use and Energy,* Science, vol. 324. no. 5931, pp. 1183–1186.

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