

## Experience on the Ground, In the Forests

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### Key Messages

- Hundreds of new international forest carbon projects in various stages of development have sprung up in the past few years. The projects are highly diverse in terms of location, scale, and approach. Some are oriented to conserve specific forest blocks, often referred to as “projects.” Other efforts are wider in scope and involve state, provincial, regional, and even national policies and measures.
- Most efforts are in an early stage of development and the most common attribute is that they are oriented toward a performance-based approach in which carbon finance is tied to measured changes in land use and associated emissions.
- There is substantial interest in international forest carbon projects, and worldwide capacity on the issue is growing.
- Key challenges remain, notably the question of who owns forest carbon rights in developing countries, as well as policy, market, and regulatory uncertainty and initial on-the-ground project funding.
- Even with these challenges, new conservation policies are being explored, new partnerships formed, and new approaches to conservation vetted around forest carbon.
- Decision makers should monitor and consult with real forest carbon projects to ensure that new policies are practical and effective at making conservation succeed on the ground.

Since 2005 efforts to include tropical forests in climate policy have gained surprising momentum. These policy developments have been accompanied by a proliferation of new forest carbon project proposals worldwide. International forest carbon projects in developing countries are highly diverse in terms of location, scale, and approach. Some of these conservation efforts are oriented to conserve specific forest blocks (these are often referred to as “projects”); others are wider in scope and involve more state, provincial, and regional policies and measures. An example of a site-specific project is the Maya Selva project in Calakmul, Mexico. This project has been raising funds and paying specific local communities to not deforest certain areas for several years. Other efforts involve regional or state plans and

policies to lower deforestation for vast areas. Examples of this include the Governors of Cross River State (Nigeria), Aceh Province (Indonesia), and Amazonas (Brazil) who have begun taking steps to curtail regional rates of deforestation and raise forest carbon funds. These regional initiatives cover hundreds of thousands of hectares of threatened forests. Even more sweeping plans are being pursued by some national governments in the developing world: the governments of Guyana, Brazil, and Peru have announced they will lower national deforestation rates if developed countries provide adequate financing. Two new funds run by the World Bank and the United Nations have raised tens of millions of dollars to help developing countries reduce national rates of deforestation.

\* Each brief in this series corresponds to a chapter in the Nicholas Institute’s report on forest carbon, titled *International Forest Carbon and the Climate Change Challenge: Issues and Options*. The full report, and each brief in the series, can be found at <http://www.nicholas.duke.edu/institute>.

## A proliferation of forest carbon projects

Hundreds of new international forest carbon projects in various stages of development have sprung up in the past few years. Although there is no central database, several resources have catalogued this growth in forest carbon projects.

In addition to these databases of projects, many “unlisted” projects are in various stages of development. According to the World Bank, Indonesia has at least 20 subnational forest carbon projects, many of them championed by private nonprofit or for-profit partners.<sup>1</sup> Brazil, Madagascar, and Mexico are other countries with multiple subnational forest carbon projects within their jurisdictions.

Nongovernmental groups have also been active. Conservation International (a U.S. nonprofit) has several dozen forest carbon projects underway worldwide.<sup>2</sup> Other large NGOs such as The Nature Conservancy (TNC) and Fauna and Flora International (FFI) have multiple projects they are developing or operating with local partners and private companies. TNC has forest carbon projects in Bolivia, Belize, Brazil, Indonesia, and China (as well as projects in the United States). FFI has created a special task force with Macquarie Bank of Australia to develop six initial forest carbon projects worldwide.

Importantly, the vast majority of forest carbon initiatives (national or subnational) are still in the development phase. Only a handful of these subnational forest carbon projects have been operating more than a few years. These older projects include the Noel Kempff project (Bolivia),<sup>3</sup> the Mantadia project (Madagascar),<sup>4</sup>

the Scolel Te (Mexico),<sup>5</sup> the Mbaracayu project (Paraguay),<sup>6</sup> the Selva Maya Carbon Offset project (Mexico),<sup>7</sup> the Nhambita project (Mozambique),<sup>8</sup> and a few others. To some extent, all of these projects make payments to communities for not deforesting. Of the projects that have been operating, there is no central depository for project information such as audits, reports, or carbon credits registered or sold. Only the Nhambita project in Mozambique has a comprehensive public “library” of information on the project (see Appendix for details on this project).

Thus, despite the growing enthusiasm for forest carbon policies and projects, there is little quantitative information to evaluate successes or failures of forest carbon projects. This is likely to change in the coming year for several reasons. First, several new voluntary carbon standards are maturing, notably the Voluntary Carbon Standard (VCS)<sup>9</sup> and the Climate, Community, and Biodiversity Alliance (CCBA).<sup>10</sup> Other tools are emerging, such as the recent Forest Carbon Portal from Ecosystem Marketplace which tracks forest carbon projects.<sup>11</sup> These systems, although unregulated, will begin to aggregate useful information over the next few years. Additionally, as negotiations accelerate toward a UN or U.S. policy on international forest carbon, developing countries may begin to require subnational projects to register domestically. Finally, many projects will begin to move beyond the startup phase and begin operations and external auditing. Even with these limitations, there are common attributes and conclusions that might help inform policy development.

**Table 6.1. Developing country forest carbon initiatives.**

| System/database                                   | Scale    | Number of listed projects (planned) | Description                                                                          |
|---------------------------------------------------|----------|-------------------------------------|--------------------------------------------------------------------------------------|
| Forest Carbon Partnership Facility                | national | 25                                  | Countries submit initial plans and are in various stages of receiving capacity funds |
| UN-REDD                                           | national | 9 (potentially 12 total)            | Early stages of implementation                                                       |
| Climate, Community & Biodiversity Alliance (CCBA) | project  | 20 (at least 12 more planned)       | Early-stage projects CCBA validated for various projected impacts                    |
| Forest Portal                                     | project  | 20+                                 | A new web-based resource listing projects                                            |
| Plan Vivo                                         | project  | 3                                   | Projects meet technical specifications and can issue Plan Vivo certificates          |
| Carbon Fix                                        | project  | 1 (8 more planned)                  | Projects accredited to Carbon Fix Certificates                                       |
| Voluntary Carbon Standard                         | project  | none (dozens planned)               | Projects registered, validated, and verified to issue VCS offsets                    |

Notes: 1) National forest carbon initiatives are not in any sense owned or managed by the World Bank's FCPF. However, the FCPF website is an authoritative resource for up-to-date information on national forest carbon strategies. 2) Some projects are on multiple sites. 3) This is not an exhaustive list of all databases. 4) Many projects, especially ones in early stages and those championed by private parties, do not make their proposals publicly available. Other projects and government efforts have simply begun enforcing illegal logging laws and taking other measures to reduce deforestation; many of these do not even have concept papers or formal proposals. 5) It is widely assumed that in 2009 several forestry projects will apply to be registered by the Voluntary Carbon Standard.

## Common features of forest carbon projects

Although every forest carbon project is unique, most have common elements, including:

### *Performance-based forest conservation*

One novel aspect of forest carbon projects is that project finance and payments are directly linked to the amount of prevented deforestation or achieved reforestation. This is arguably the most exciting and controversial dimension to forest carbon projects. It is exciting because performance-based payments transform the donor-based approach to conservation (see Chapter 5 of full report) to one in which developing countries are paid for performing a service. In the case of REDD, the service is reducing deforestation and the payments reflect the perceived value of greenhouse gas emissions reductions. This evolution from environmental charity to ecosystem trade has captured the imaginations of many, as evidenced by the number of new projects, regional and state proposals, and national funds contingent on more aggressive forest protection and conservation. The concept has led to a renaissance in tropical forest conservation. The intellectual and financial capital currently being invested in forest carbon has led to new means for involving communities in sustainable forest management, new funds from developed nations and private foundations, and technical innovations that improve ways to assess forest carbon across large areas of land.

The performance-based approach is not without controversy, however (see Chapter 3 of full report). Some fear a market-based conservation system will just be one more way for foreign companies, federal governments, or elites in an area to take rights away from forest-dependent communities. There are concerns that ecosystem markets will replace traditional forms of conservation finance (such as charities and overseas development assistance) and that this approach will only benefit stable countries. What most people can agree on, however, is that linking forest carbon projects to markets fundamentally changes the nature of conservation. This approach requires new sets of scientific tools (known as methodologies) that quantify what carbon emissions have been avoided. But as we discuss below, agreed-upon methodologies have yet to be developed.

### *Projects usually start as an idea and then progress to a project*

Simple as it may sound, most forest carbon projects start when someone or some group decides to save a threatened tropical forest. Forest carbon projects can be ephemeral in their earliest stage. Many initiatives begin with proclamations about how an NGO,

municipality, or government would use carbon finance to slow deforestation. For instance at the United Nations Framework Convention on Climate Change (UNFCCC) COP 13 in 2007, three governors that hold vast tropical forests announced they would severely curtail deforestation if developed countries came forward with adequate financing. The governors from Papua and Aceh Provinces in Indonesia and Amazonas State in Brazil all gave impressive speeches.<sup>12</sup> But these speeches did not rest on newly promulgated laws or regulations. The governors did not have comprehensive plans to stop deforestation in their proverbial back pockets. Instead, these governors sought to attract interest, finance, and partners. In the case of these three governors, their voices were heard. At the same UNFCCC meeting in 2007, billions of new dollars in funding were announced by developed countries. The government of Norway alone committed several billion dollars over the next few years to help confront tropical deforestation.<sup>13</sup>

Since late 2007, all three governors noted above have gone on to develop impressive forest carbon concepts. All three initiatives really started, at some basic level, with an idea. In the case of Aceh, Indonesia, Governor Irwandi Yusuf is a champion of forest conservation and his personal history and commitment to forest conservation are inextricably linked. Irwandi was a captured Aceh separatist rebel when the devastating 2004 tsunami struck, and he was literally able to break out of prison. After a subsequent peace accord, Irwandi was democratically elected the governor of Aceh. In May 2007, soon after being elected, Governor Irwandi declared a temporary logging moratorium and personally drove his Land Rover to arrest illegal loggers. Governor Irwandi put together a credible forest carbon partnership that turned his vision into a serious proposal. Less than a year after his initial logging moratorium, the Ulu Masen avoided deforestation project, covering 750,000 hectares, had become the first major REDD project independently validated against the CCB Standards (February 2008). A few months later in April 2008, Merrill Lynch announced it would invest a minimum of \$9 million (and possibly as much as hundreds of millions of dollars) into Governor Irwandi's vision for conserving the last large unprotected forest in Sumatra.<sup>14</sup> Although the story in Aceh is unique, the majority of forest carbon projects start, simply enough, with someone who needs money to curtail deforestation. Unlike before 2005 (and the current enthusiasm for international forest carbon and REDD), these days if some group or government has a credible plan to stop imminent deforestation, governments and donors are more keen to listen and become involved.

### *Three key attributes of forest carbon projects*

Although every project is different, forest carbon proposals all have three key attributes: a threat (deforestation), solutions, and someone empowered to implement the solutions.

#### **Threat**

All forest carbon projects begin with the premise that unless compensation is provided, deforestation in a given area will occur. Identifying the threat is essential to demonstrating the additionality of the project (see Chapter 4 of full report). Most projects prove their additionality by demonstrating that current financial incentives in the area (logging, subsistence farming, plantations, ranching) have and will continue to cause deforestation. The threat is often backed up with remote sensing work, economic arguments, or facts about nearby deforestation rates.

#### **Solutions**

Forest carbon projects also provide a general sense of what will be done to abate the deforestation threat, be it increased enforcement, alternative livelihoods for local communities, or other conservation tools. While a forest carbon project could involve just one action (e.g., canceling an active logging concession), all known projects use combinations of tools to prevent deforestation. Many forest carbon projects pursue positive social and environmental activities (such as tree nurseries or payments to communities) to complement regulatory measures (such as increased enforcement, canceled logging rights, or new land-use restrictions). This reflects the growing consensus that alternative livelihoods are critical to stop deforestation for long periods (see Chapter 5 of full report). This new consensus believes such complementary measures must make conservation financially more attractive and enduring to stakeholders than deforestation. Many forest carbon proponents also view economic development as critical to alleviating local leakage and building sustained community support, and thus helping ensure longevity of carbon abatement.

#### **Someone in charge**

To succeed, forest carbon proposals also need a central authority. This varies depending on the scale of the project. Obviously, national avoided deforestation initiatives, like those listed at the World Bank and UN, have federal governments in charge. Subnational projects are often championed by private groups (profit or nonprofit) and usually engage local or regional governments. Many subnational projects have engaged private companies that help develop and pre-finance projects (and expect to make a profit). One critical reason it is important for projects to state “who is in

charge” is because often there is disagreement about who owns forest carbon in developing countries (see Chapter 5 of full report).

### *Commitment to measurement and independent review*

At the national level, developing countries are just beginning to think about how they will measure carbon stocks, rates of deforestation and other variables for entire countries over time. The national REDD plans published at the World Bank’s Forest Carbon Partnership Facility<sup>15</sup> describe various governments’ plans to confront deforestation and measure progress. Most developing countries are actively deciding how to combine remote sensing information on land cover change with field measurements on carbon stocks.<sup>16</sup> Some countries are already doing elaborate national monitoring and peer review of forest carbon stocks (Mexico<sup>17</sup>) and forest cover change (India and Brazil). Most governments already report national-level statistics on forest cover change and carbon stocks to various international bodies that involve modest levels of review.<sup>18</sup>

Most subnational projects have plans to measure, report, and verify reductions in deforestation and associated carbon emissions. In the voluntary space, the CCBA has thus far only validated subnational forest carbon projects and all projects undergo external review. The pending Voluntary Carbon Standard also requires multiple layers of external review of monitoring plans and other aspects. During these reviews (and depending on the system), auditors might evaluate forest carbon stock estimates, business-as-usual land-use change scenarios, estimates of leakage, and other variables required for emission reductions to be quantified. Auditors also are involved with assessing how baselines are calculated and how carbon credits are generated and monitored. Third party audits help lend legitimacy to projects and have been useful to projects for identifying interested potential buyers or project partners.

### **What lessons have been learned from early forest carbon activities?**

Sustainable forest management in developing countries is difficult. Decades of well-intentioned efforts, agreements, meetings, reports, and funding have made some strides in slowing deforestation, but have not been widely successful (see Chapter 5 of full report).

Most real on-the-ground challenges to forest carbon projects in developing countries are the same challenges facing any conservation programs (or any development programs for that matter). These

challenges are basic and rudimentary: poverty, poor infrastructure, lack of funding, underdevelopment, poor capacity and education, weak institutions, corrupt governance. Forest carbon finance may help provide a new set of incentives to save and restore forests and to address these challenges across political scales, but arresting forest declines and transitioning to sustainable forestry is not something for which there is an easy solution or “playbook.” So while the new focus on performance-based payments for international forest carbon has created a resurgence in solutions to saving and restoring tropical forests, serious challenges remain ahead. What lessons have been learned from the past few years of enthusiasm for new forest carbon projects and policies?

#### *Lesson 1: Science can support forest carbon markets*

There have been substantial developments in the technical and scientific underpinnings of forest carbon credits. The past few years have seen a steady rise in innovation on how to create consistent and reliable metrics for a credible, additional forest carbon credits. These developments include refined scientific applications for estimating baselines of deforestation, new methods for estimating land cover changes, and a growing set of tools to understand the carbon content of forest and of avoided emissions. These new tools are being demonstrated at the UN website for REDD<sup>19</sup> and through the work of forest carbon projects and methodologies in the voluntary markets and in multilateral funds.

#### *Lesson 2: There is massive interest in using carbon finance to stem deforestation*

Given Lesson 1, donors and developing countries alike want to use carbon finance and performance-based payments to make positive impacts on forest use worldwide. This interest is clear at the policy level (for compliance credits or units within the UNFCCC and in U.S. legislation) and also in voluntary carbon markets. Philanthropic giving in the area has also grown. All of this suggests that if clear rules and methodologies can be developed, substantial conservation innovation can occur rapidly.

#### *Lesson 3: Capacity is rapidly growing*

The generosity of donors and the eagerness of subnational and national constituents to use carbon finance have spawned a new corps of experts in international forest carbon. A few years ago, there were probably a few dozen “experts” in the field. Today, there are hundreds of new projects, funds, and initiatives to train and educate developing country forest carbon practitioners. The World Bank, the government of Norway, and numerous private initiatives have begun

to fund training for countries and projects. Governance capacity is also growing. Many countries are developing national strategies to address deforestation through new policies and programs. These national innovations are being informed and abetted by many subnational forest carbon projects. Although there is always room for capacity growth, the trend is clearly positive in this regard.

#### *Lesson 4: Political uncertainties slow investment in projects*

Many projects making clear strides to reduce deforestation and emissions are having a hard time financially. There are hundreds of initiatives that involve clear deforestation threats, clear solutions, and clear leadership ready to roll up their sleeves and work. Most of the new funds released by donor governments (Norway, the UK, and others) are oriented toward enhancing capabilities in developing countries, collecting baseline information, and other technical work. Only one forest carbon fund, the Congo Basin Forest Fund, has made a strong commitment to get money rapidly to real forest carbon projects on the ground. And even this effort, which received 188 proposals in its first round (94 which met the Fund’s stated criteria), was only able to fund a handful of projects with clear conservation benchmarks. Private investment focused on future compliance markets will be slow to materialize until there is greater political certainty.

#### *Lesson 5: Who owns forest carbon rights is still a vexing issue*

There has been considerable progress and experience in understanding how to involve local forest communities and people in forest carbon projects.<sup>20</sup> This includes both legal deliberations in many countries (e.g., who owns forest carbon and what rights they have) as well as practical considerations such as how to deliver funds to local people and how to guarantee financial transparency. Still, many countries have yet to meaningfully grapple with the concept of who really owns forest carbon. This will be particularly difficult given that ownership of forests and land in many developing countries is often uncertain and sometimes faces conflicting jurisdiction (see Chapter 5 of full report). The question of carbon ownership and rights will have no easy answer, even in those few developing countries where forest ownership is more certain. Countries will need to decide how local forest guardians and tenants will be engaged. This question remains a contentious topic for many forest communities, for multilateral funders, for many nongovernmental organizations involved in brokering and fostering projects, and for the U.S. and international communities negotiating forest carbon policies. Many concerns about communities

and carbon credits are being raised in part simply because “someone is finally listening” to community concerns.

*Lesson 6: It's hard to move from inception to implementation*

Probably the most important lesson of the past few years is that forest carbon projects in developing countries are easy to imagine, but hard to make a reality. Currently there are hundreds or even possibly thousands of new forest carbon project concepts and proposals. Only a handful have gone from project inception and design to acquiring funding and implementing real forest conservation and restoration activities to verifying carbon credits against specified methodologies. This, despite growing financial support for capacity development in REDD and international forest carbon. This suggests short-term funding should target both broad capacity outreach as well as specific support to help projects advance. It also suggests that donors, investors, and the public at large should be patient, as these projects take time. One NGO (Conservation International) estimates it takes around 29 months to go from project inception to implementation.<sup>21</sup> Part of the reason for the abundance of project proposals and the lack of forest carbon credits is the relative novelty of using carbon finance for sustainable forestry. Before 2005, the concept of carbon-based payments for avoided deforestation or forest restoration was still highly questionable. Since then, there has been significant political momentum and interest by projects and countries to implement forest carbon projects. But the lack of methodologies and uncertain policy environment has made real progress—on the ground, in the forest—slow. The momentum behind REDD and international forest carbon, however, is picking up. There are many technical and institutional studies under way to help projects begin more rapidly and successfully, once policy decisions are made and international forest carbon funding is clarified.

## Conclusion

Forest conservation in any country, developed or developing, is a massive challenge. Success is never certain, and even when achieved, it is never guaranteed. Conservation must succeed year after year, hectare by hectare, often in the face of growing resource and economic demands.

Forests in many developing countries face overwhelming pressures to be cut, cleared, and burned (see Chapter 5 of full report). Reducing rates of tropical deforestation has been an elusive goal for many countries and donors alike. The concept of performance-based payments for sustainable tropical forest carbon management has raised the hopes of many. Tying finance to actual achieved and measured conservation is likely to introduce new ways for reducing deforestation and increasing sustainable forest management. Even with policy and methodological uncertainty and other challenges, new conservation policies are being explored, new partnerships formed, and new approaches to conservation vetted. Decision makers should monitor and consult with real forest carbon projects to ensure that any new forest carbon policies are practical and effective at making conservation succeed on the ground.

## References

- 1 Fogarty, D. 2009. Indonesia forest CO2 rules need finance clarity: Experts. Reuters UK. <http://uk.reuters.com/article/behindTheScenes/idUKTRE54711620090508>.
- 2 <http://conservation.org/learn/forests/Pages/overview.aspx>. Viewed February 12, 2009.
- 3 <http://www.noelkempff.com>.
- 4 [http://wbcarbonfinance.org/docs/Day\\_4a\\_BioCF\\_-\\_CI\\_Madagascar\\_Andr%C3%A9\\_Aquino\\_BioCF\\_Training\\_Jan08.ppt#633,11,Emissions Reductions & financing](http://wbcarbonfinance.org/docs/Day_4a_BioCF_-_CI_Madagascar_Andr%C3%A9_Aquino_BioCF_Training_Jan08.ppt#633,11,Emissions%20Reductions%20&%20financing).
- 5 <http://www.planvivo.org/fx.planvivo/scheme/mexico.aspx>.
- 6 [http://www.ecosystemmarketplace.com/pages/article.news.php?component\\_id=5493&component\\_version\\_id=&language\\_id=12](http://www.ecosystemmarketplace.com/pages/article.news.php?component_id=5493&component_version_id=&language_id=12).
- 7 [http://www.rainforest2reef.org/donate\\_carbon.html](http://www.rainforest2reef.org/donate_carbon.html). Viewed January 12, 2009.
- 8 <http://www.planvivo.org/fx.planvivo/scheme/mozambique.aspx>.
- 9 <http://www.v-c-s.org>.
- 10 <http://www.climate-standards.org>.
- 11 <http://www.forestcarbonportal.com>.
- 12 [http://tropicalforestgroup.org/news/7\\_dec\\_cop.html](http://tropicalforestgroup.org/news/7_dec_cop.html).
- 13 <http://www.regjeringen.no/en/dep/md/Selected-topics/klima/why-a-climate-and-forest-initiative.html?id=526489>.
- 14 [http://www.ml.com/index.asp?id=7695\\_7696\\_8149\\_88278\\_95339\\_96307](http://www.ml.com/index.asp?id=7695_7696_8149_88278_95339_96307).
- 15 <http://go.worldbank.org/57X9QKTON0>. Viewed January 12, 2009.
- 16 Davis, Crystal et al. A Review of 25 Readiness Plan Idea Notes from the World Bank Forest Carbon Partnership Facility. WRI Working Paper. World Resources Institute, Washington, D.C. February 2009. <http://www.wri.org/gfi>.
- 17 [http://unfccc.int/files/methods\\_and\\_science/lulucf/application/pdf/080625\\_mexico.pdf](http://unfccc.int/files/methods_and_science/lulucf/application/pdf/080625_mexico.pdf).
- 18 Most developing countries are doing this in at least two ways: 1) via national communications from countries to the UNFCCC secretariat, and 2) via the Food and Agricultural Organization (FAO). These two channels do not use compatible standards and often yield different results. The level of review is generally cursory.
- 19 UNFCCC REDD platform: Methods and Tools. [http://unfccc.int/methods\\_science/redd/methodologies/items/4538.php](http://unfccc.int/methods_science/redd/methodologies/items/4538.php).
- 20 Although some would say still woefully inadequate discussions and deliberations.
- 21 Personal communication with S. Pandya.

The authors acknowledge the support of the David & Lucile Packard Foundation and the helpful comments of Dan Zarin at Packard. We also appreciate the review comments of Evan Notman, Lou Verchot, Christine Johnson, Phil Ovitt, and Brian Murray, as well as the assistance of Paul Brantley of the Nicholas Institute. This policy brief is part of a series of briefs based on the report *International Forest Carbon and the Climate Change Challenge: Issues and Options*. The full report and other briefs are posted on the Nicholas Institute website at <http://www.nicholas.duke.edu/institute>.



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